Final
Third Quarter 2014 - Quarterly Groundwater Monitoring Report Outside Tunnel Wells

Red Hill Bulk Fuel Storage Facility
Joint Base Pearl Harbor-Hickam, Oahu, Hawaii

DOH Facility ID: 9-102271
DOH Release ID: 990051, 010011, 020028, and 140010

September 2014

Department of the Navy
Naval Facilities Engineering Command, Hawaii
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NAVFAC
Naval Facilities Engineering Command
NAVFAC HAWAII

Contract Number N62742-12-D-1853, CTO 0002

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Prepared under:

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FINAL
THIRD QUARTER 2014 - QUARTERLY GROUNDWATER MONITORING REPORT
OUTSIDE TUNNEL WELLS
RED HILL BULK FUEL STORAGE FACILITY

Long-Term Groundwater and Soil Vapor Monitoring
Red Hill Bulk Fuel Storage Facility
Joint-Base Pearl Harbor-Hickam, Oahu, Hawaii

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ACRONYMS AND ABBREVIATIONS

ACRONYMS/ ABBREVIATIONS	DEFINITION/MEANING
%	percent
COPC	Contaminant of Potential Concern
DLNR	State of Hawaii Department of Land and Natural Resources
DOH	State of Hawaii Department of Health
DON	Department of the Navy
EAL	Environmental Action Level
EPA	Environmental Protection Agency
ESI	Environmental Science International
F-76	Marine Diesel Fuel
ID	Identification
JBPHH	Joint Base Pearl Harbor-Hickam
JP-5	Jet Fuel Propellant-5
JP-8	Jet Fuel Propellant-8
LCS	Laboratory Control Sample
LCSD	Laboratory Control Sample Duplicate
LOD	Limit of Detection
LOQ	Limit of Quantitation
µg/L	micrograms per liter
MS	Matrix Spike
MSD	Matrix Spike Duplicate
NAVFAC	Naval Facilities Engineering Command
NAVSUP FLC	Naval Supply Systems Command Fleet Logistics Center
N.D.	Not Detected
PAH	Polycyclic Aromatic Hydrocarbons
PARCCS	Precision, Accuracy, Representativeness, Completeness, Comparability, and Sensitivity
pH	hydrogen activity
QC	Quality Control
RHSF	Red Hill Bulk Fuel Storage Facility
RPD	Relative Percent Difference
SAP	Sampling and Analysis Plan
TEC	The Environmental Company, Inc.
TPH-d	Total Petroleum Hydrocarbons as diesel
TPH-g	Total Petroleum Hydrocarbons as gasoline
U.S.	United States of America
UST	Underground Storage Tank
VOC	Volatile Organic Compounds
WP	Work Plan

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EXECUTIVE SUMMARY

This quarterly monitoring report presents the results of the third quarter 2014 groundwater sampling event conducted on July 23 and 24, 2014, at the outside tunnel wells of the Red Hill Bulk Fuel Storage Facility [RHSF], Joint Base Pearl Harbor-Hickam [JBPHH], Hawaii. The RHSF is located in Halawa Heights on the Island of Oahu. There are 18 active and 2 inactive underground storage tanks [USTs] located at the RHSF. The State of Hawaii Department of Health [DOH] Facility Identification [ID] number is 9-102271. The DOH Release ID numbers are 990051, 010011, 020028, and 140010.

The groundwater sampling was conducted as part of the long-term groundwater and soil vapor monitoring at the RHSF and concurrent with release response activities initiated at Tank 5 in January, under Naval Facilities Engineering Command [NAVFAC] Contract Number N62742-12-D-1853. The sampling was conducted in accordance with the approved Work Plan [WP]/Sampling and Analysis Plan [SAP] prepared by Environmental Science International [ESI].

On July 23 and 24, 2014, ESI personnel collected groundwater samples from three outside tunnel monitoring wells (wells OWDFMW01, HDMW2253-03, and RHMW04). A primary and duplicate groundwater sample were collected from well OWDFMW01. All groundwater samples were analyzed for petroleum constituents. Analytical results were compared to DOH Environmental Action Levels (EALs) for gross contamination and drinking water toxicity. A summary of the analytical results is provided below.

- **HDMW2253-03** – None of the chemical constituents analyzed for were detected.

- **OWDFMW01** – TPH-d (17 and 15 µg/L), naphthalene (0.031 and 0.027 µg/L), and acetone (6.4 and 9.8 µg/L) were detected in both the primary and duplicate sample. None of the detected concentrations exceeded the DOH EALs. TPH-d concentrations in this well have been generally decreasing since an increase in November 2012, and were below both DOH EALs for the first time since July 2012.

- **RHMW04** – TPH-d (17 µg/L) was the only analyte detected. The TPH-d concentration detected did not exceed the DOH EALs. This well had not been sampled since April 2010. TPH-d had never been detected in samples from this well; however, the laboratory limits of detection (LODs) were an order of magnitude higher in the past and above both the concentration detected during this round and the current DOH EALs.

Since the wells were last sampled (April 2014 for wells HDMW2253-03 and OWDFMW01; and April 2010 for well RHMW04), groundwater contaminant concentrations remained at low concentrations and did not change significantly, or were not detected. No COPCs were detected in any well at concentrations above the DOH EALs.

Based on the results of the assessment, continued groundwater monitoring at the RHSF is recommended. If the TPH-d concentrations significantly increase, the monitoring frequency

should be increased to monthly, even though wells RHMW04, HDMW2253-03, and OWDFMW01 are not included in the RHSF Groundwater Protection Plan.

SECTION 1 – INTRODUCTION

This quarterly monitoring report presents the results of the third quarter 2014 groundwater sampling event conducted on July 23 and 24, 2014, at the outside tunnel wells of the RHSF, JBPHH, Hawaii. The RHSF is located in Halawa Heights on the Island of Oahu. The purpose of the sampling is to (1) assess the condition of groundwater beneath and in the vicinity of the RHSF with respect to chemical constituents associated with jet fuel propellant and marine diesel fuel, and (2) to ensure the Navy remains in compliance with DOH UST release response requirements as described in Hawaii Administrative Rules 11-281 Subchapter 7, Release Response Action (DOH, 2013). The DOH Facility ID number for the RHSF is 9-102271. The DOH Release ID numbers are 990051, 010011, 020028, and 140010.

The groundwater sampling was conducted as part of the long-term groundwater and soil vapor monitoring at the RHSF, under NAVFAC Contract Number N62742-12-D-1853. The sampling was conducted in accordance with the approved WP/SAP prepared by ESI (ESI, 2012).

1.1 SITE DESCRIPTION

The RHSF is located on federal government land (zoned F1 - Military and Federal), located in Halawa Heights, approximately 2.5 miles northeast of Pearl Harbor (Figure 1). It is located on a low ridge on the western edge of the Koolau Mountain Range that divides Halawa Valley from Moanalua Valley. The RHSF is bordered on the north by Halawa Correctional Facility and private businesses, on the west by the United States of America [U.S.] Coast Guard reservation, on the south by residential neighborhoods, and on the east by Moanalua Valley. A quarry is located less than a quarter mile away to the northwest. The RHSF occupies 144 acres of land and the majority of the site is at an elevation of approximately 200 to 500 feet above mean sea level.

The RHSF contains 18 active and 2 inactive USTs, which are operated by Naval Supply Systems Command Fleet Logistics Center [NAVSUP FLC] Pearl Harbor (formerly Fleet and Industrial Supply Center). Each UST has a capacity of approximately 12.5 million gallons. The RHSF is located approximately 100 feet above the basal aquifer. The USTs contain Jet Fuel Propellant-5 [JP-5], Jet Fuel Propellant-8 [JP-8], and Marine Diesel Fuel [F-76]. The current status of each of the USTs is summarized in Table 1.1.

Three groundwater monitoring wells (wells RHMW04, HDMW2253-03, and OWDFMW01) are located outside of the RHSF tunnel system (Figure 2). Well HDMW2253-03 is located at the Halawa Correctional Facility (outside the RHSF), well OWDFMW01 is located at the Oily Waste Disposal Facility near Adit 3, and well RHMW04 is located near the Navy Firing Range . Four groundwater monitoring wells (wells RHMW01, RHMW02, RHMW03, and RHMW05) are located within the RHSF lower access tunnel, and one sampling point (RHMW2254-01) is located at Red Hill Shaft. Monitoring data for the four wells located inside the tunnel and one sampling point at Red Hill Shaft are included in a separate report.

As noted, monitoring wells RHMW01, RHMW02, RHMW03, and RHMW05 are located inside the underground tunnels. Sampling point RHMW2254-01 is located inside the infiltration gallery of the Department of the Navy [DON] drinking water supply Well 2254-01. DON Well 2254-01 is located approximately 2,400 feet downgradient of the USTs and provides potable water to the JBPHH Water System, which serves approximately 65,200 military customers. NAVFAC Public Works Department operates the infiltration gallery and DON Well 2254-01.

TABLE 1.1
Current Status of the USTs
Red Hill Bulk Fuel Storage Facility
July 2014 Quarterly Monitoring Report

Tank Identification	Fuel Type	Status	Capacity
F-1	None	Inactive	12.5 million gallons
F-2	JP-8	Active	12.5 million gallons
F-3	JP-8	Active	12.5 million gallons
F-4	JP-8	Active	12.5 million gallons
F-5	JP-8	Active	12.5 million gallons
F-6	JP-8	Active	12.5 million gallons
F-7	JP-5	Active	12.5 million gallons
F-8	JP-5	Active	12.5 million gallons
F-9	JP-5	Active	12.5 million gallons
F-10	JP-5	Active	12.5 million gallons
F-11	JP-5	Active	12.5 million gallons
F-12	JP-5	Active	12.5 million gallons
F-13	F-76	Active	12.5 million gallons
F-14	F-76	Active	12.5 million gallons
F-15	F-76	Active	12.5 million gallons
F-16	F-76	Active	12.5 million gallons
F-17	JP-5	Active	12.5 million gallons
F-18	JP-5	Active	12.5 million gallons
F-19	None	Inactive	12.5 million gallons
F-20	JP-5	Active	12.5 million gallons

F-76 Marine Diesel Fuel
JP-5 Jet Fuel Propellant-5
JP-8 Jet Fuel Propellant-8

1.2 PHYSICAL SETTINGS

Climatological conditions in the area of the RHSF consist of warm to moderate temperatures and low to moderate rainfall. The RHSF is leeward of the prevailing northeasterly trade winds. The average annual precipitation is approximately 40 inches, which occurs mainly between November and April (State of Hawaii Department of Land and Natural Resources [DLNR], 1986). Annual pan evaporation is approximately 75 inches (DLNR, 1985). Average temperatures range from the low 60's to high 80's (degrees Fahrenheit) (Atlas of Hawaii, 1983).

Oahu consists of the eroded remnants of two shield volcanoes, Waianae and Koolau. The RHSF is located on the southwest flank of the Koolau volcanic shield. Lavas erupted during the shield-building phase of the volcano belong to the *Koolau Volcanic Series* (Stearns and Vaksvik, 1935). Following formation of the Koolau shield, a long period of volcanic quiescence occurred,

during which the shield was deeply eroded. Following this erosional period, eruptive activity resumed. Lavas and pyroclastic material erupted during this period belong to the *Honolulu Volcanic Series* (Stearns and Vaksvik, 1935).

In the immediate area of the RHSF, Koolau Volcanic Series lavas dominate, although there are consolidated and unconsolidated non-calcareous deposits in the vicinity that consist of alluvium generated during erosion of the Koolau volcanic shield. South-southwest of the Site, and in isolated exposures to the west, are pyroclastic deposits formed during eruptions from three Honolulu Volcanic Series vents, Salt Lake, Aliamanu, and Makalapa (Stearns and Vaksvik, 1935). Based on established geology and records of the drilled wells (Stearns and Vaksvik, 1938), the RHSF is underlain by Koolau Volcanic Series basalts. The area of the RHSF is classified as *Rock Land*, where 25 to 90% of the land surface is covered by exposed rock and there are only shallow soils (Foote, et al., 1972).

Groundwater in Hawaii exists in two principal types of aquifers. The first and most important type, in terms of drinking water resources, is the basal aquifer. The basal aquifer exists as a lens of fresh water floating on and displacing seawater within the pore spaces, fractures, and voids of the basalt that forms the underlying mass of each Hawaiian island. In parts of Oahu, groundwater in the basal aquifer is confined by the overlying caprock and is under pressure. Waters that flow freely to the surface from wells that tap the basal aquifer are referred to as *artesian*.

The second type of aquifer is the caprock aquifer, which consists of various kinds of unconfined and semi-confined groundwater. Commonly, the caprock consists of a thick sequence of nearly impermeable clays, coral, and basalt, which separates the caprock aquifer from the basal aquifer. The impermeable nature of these materials and the artesian nature of the basal aquifer severely restrict the downward migration of groundwater from the upper caprock aquifer. In the area of the RHSF, there is no discernible caprock.

Groundwater in the area of the RHSF is part of the *Waimalu Aquifer System* of the *Pearl Harbor Aquifer Sector*. The aquifer is classified as a basal, unconfined, flank-type; and is currently used as a drinking water source. The aquifer is considered fresh with less than 250 milligrams per liter of chloride and is considered an irreplaceable resource with a high vulnerability to contamination (Mink and Lau, 1990).

The nearest drinking water supply well is the DON Well 2254-01, located in the infiltration gallery within the RHSF. DON Well 2254-01 is located approximately 2,400 feet downgradient of the USTs (Figure 2).

1.3 BACKGROUND

The RHSF was constructed by the U.S. Government in the early 1940s. Twenty USTs and a series of tunnels were constructed to supply fuel to the Navy. The USTs were constructed of steel and they currently contain JP-5, JP-8, and F-76. Several tanks in the past have stored

DON special fuel oil, DON distillate, aviation gasoline, and motor gasoline (Environet, 2010). The fueling system is a self-contained underground unit that was installed into native rock comprised primarily of basalt with some interbedded tuffs and breccias (Environet, 2010). Each UST measures approximately 250 feet in height and 100 feet in diameter. The upper domes of the tanks lie at depths varying between 100 feet and 200 feet below ground surface.

In response to increasing concentrations of contaminants of potential concern [COPCs] in the groundwater monitoring wells within the facility (specifically RHMW02) during the 2008 sampling events, quarterly groundwater monitoring was initiated in 2009 at the outside tunnel wells.

In 2009, groundwater samples were collected from wells RHMW04, OWDFMW01, and HDMW2253-03. Samples were collected in August and October 2009. None of the COPCs were detected at concentrations exceeding the current gross contamination or drinking water toxicity DOH EALs.

In 2010, groundwater samples were collected from wells RHMW04, OWDFMW01, and HDMW2253-03. Samples were collected from well RHMW04 in January and April 2010. Samples were collected from well OWDFMW01 in January, April, and October 2010. Samples were collected from well HDMW2253-03 in January, April, July and October 2010. The COPCs concentrations exceeding current DOH EALs are summarized below.

- **HDMW2253-03** – TPH-d was detected at a concentration above the gross contamination and drinking water toxicity DOH EAL in January 2010 (The Environmental Company, Inc. [TEC], 2010a).
- **OWDFMW01** – TPH-d was detected at a concentration above the gross contamination and drinking water toxicity DOH EALs in January and April 2010 (TEC, 2010a; TEC, 2010b).

In 2011, groundwater samples were collected from wells OWDFMW01 and HDMW2253-03. Samples were collected in January, April, July, and October 2011. None of the COPCs were detected at concentrations exceeding the current gross contamination or drinking water toxicity DOH EALs. In Fall 2011, the DOH EALs were revised. The drinking water toxicity EAL for TPH-d decreased from 210 to 190 µg/L.

In 2012, groundwater samples were collected from wells OWDFMW01 and HDMW2253-03. Samples were collected in January, April, July, and November 2012. TPH-d was detected at a concentration above the DOH EALs in samples collected from wells HDMW2253-03 and OWDFMW01 (Environet, 2012; ESI, 2013a). The COPCs concentrations exceeding current DOH EALs are summarized below.

- **HDMW2253-03** – TPH-d was detected at a concentration above the DOH EALs for gross contamination and drinking water toxicity in April and November 2012.
- **OWDFMW01** – TPH-d was detected at a concentration above the DOH EALs for gross contamination and drinking water toxicity in April 2012.

In 2013, groundwater samples were collected from wells OWDFMW01 and HDMW2253-03. Samples were collected in January, April, July, and October 2013. TPH-d was detected at a concentration above the DOH EALs in samples collected from wells HDMW2253-03 and OWDFMW01 (ESI, 2013b, 2013c, 2013d, and 2014a). The COPCs concentrations exceeding current DOH EALs are summarized below.

- **HDMW2253-03** – TPH-d was detected at a concentration above the DOH EALs for gross contamination and drinking water toxicity in January 2013.
- **OWDFMW01** – TPH-d was detected at a concentration above the DOH EALs for gross contamination and drinking water toxicity in all four quarters during 2013.

In January 2014, an additional groundwater sampling was conducted at HDMW2253-03 in response to a suspected release from Tank 5. None of the COPC concentrations exceeded the current DOH EALs (ESI, 2014b).

In January 2014, groundwater samples were collected from wells OWDFMW01 and HDMW2253-03 (ESI 2014c). TPH-d was detected at a concentration above the DOH EALs in samples collected from well OWDFMW01. The COPC concentrations exceeding current DOH EALs are summarized below.

- **OWDFMW01** – TPH-d was detected at a concentration above the DOH EAL for gross contamination.

In April 2014, groundwater samples were collected from wells OWDFMW01 and HDMW2253-03 (ESI 2014d). TPH-d was detected at concentrations above the DOH EALs in samples collected from both wells. The COPC concentrations exceeding current DOH EALs are summarized below.

- **HDMW2253-03** – TPH-d was detected at a concentration above the DOH EALs for both gross contamination and drinking water toxicity.
- **OWDFMW01** – TPH-d was detected at a concentration above the DOH EALs for both gross contamination and drinking water toxicity in one of the two samples collected from this well.

After reviewing the chromatograms and the historical data for the three samples, it was determined that the TPH-d subsample for the sample from HDMW2253-03 and the duplicate sample from OWDFMW01 likely had been switched. If this was the case, the TPH-d concentrations detected in OMDFMW01 would exceed both gross contamination and drinking water DOH EALs and the TPH-d concentration detected in HDMW2253-03 would be below both DOH EALs.

1.3.1 Previous Reports

The following groundwater monitoring reports were previously submitted to the DOH:

1. Groundwater Monitoring Report, August 2009 (submitted September 2009).
2. Groundwater Monitoring Report, October 2009 (submitted December 2009).
3. Groundwater Monitoring Report, January, 2010 (submitted April 2010).
4. Groundwater Monitoring Report, April 2010 (submitted May 2010).
5. Groundwater Monitoring Report, July 2010 (submitted August 2010).
6. Groundwater Monitoring Report, October 2010 (submitted December 2010).
7. Groundwater Monitoring Report, January 2011 (submitted March 2011).
8. Groundwater Monitoring Report, April 2011 (submitted June 2011).
9. Groundwater Monitoring Report, July 2011 (submitted September 2011).
10. Groundwater Monitoring Report, October 2011 (submitted December 2011).
11. Groundwater Monitoring Report, January 2012 (submitted March 2012).
12. Groundwater Monitoring Report, April 2012 (submitted July 2012).
13. Groundwater Monitoring Report, July 2012 (submitted August 2012).
14. Groundwater Monitoring Report, November 2012 (submitted January 2013).
15. Groundwater Monitoring Report, January 2013 (submitted April 2013).
16. Groundwater Monitoring Report, April 2013 (submitted July 2013).
17. Groundwater Monitoring Report, July 2013 (submitted September 2013).
18. Groundwater Monitoring Report, October 2013 (submitted January 2014).
19. Groundwater Monitoring Report for Additional Sampling of HDMW2253-03, January 2014 (submitted February 2014).
20. Groundwater Monitoring Report, January 2014 (submitted April 2014).
21. Groundwater Monitoring Report, April 2014 (submitted June 2014).

SECTION 2 – GROUNDWATER SAMPLING

On July 23 and 24, 2014, ESI personnel collected groundwater samples from three monitoring wells (wells OWDFMW01, HDMW2253-03, and RHMW04). A primary and duplicate groundwater sample were collected from well OWDFMW01. The samples were collected in accordance with the 2012 WP/SAP (ESI, 2012). The WP/SAP is consistent with DOH UST release response requirements (DOH, 2000); DoN Procedure I-C-3, *Monitoring Well Sampling* (DoN, 2007); and the RHSF Groundwater Protection Plan (TEC, 2008). Prior to purging and sampling, the depth to groundwater and the depth to the bottom of the wells were measured by ESI using a Geotech oil/water interface probe. The measurements are included in the groundwater sampling logs. No measurable product, sheen, or petroleum hydrocarbon odor was observed in any of the wells.

2.1 GROUNDWATER SAMPLING

Prior to collecting groundwater samples, the monitoring wells were purged of standing water in the well casings. Wells OWDFMW01 and HDMW2253-03 were purged using disposable bailers. Well RHMW04 contains a dedicated bladder pump which was used to purge the well and to collect samples. The monitoring wells were purged at rates of 0.31 to 0.42 liters per minute.

Water quality parameters were monitored on a periodic basis during well purging. The water quality parameters that were measured included hydrogen activity [pH], temperature, conductivity, dissolved oxygen, and oxidation reduction potential. The water quality parameters were evaluated to demonstrate that the natural characteristics of the aquifer formation water were present within the monitoring well before collecting the sample. At least four readings were collected during the purging process. Purging was considered complete when at least three consecutive water quality measurements stabilized within approximately 10%. The readings were recorded on groundwater monitoring logs which are included in Appendix A. The field notes are included in Appendix B.

When the water quality parameters stabilized, groundwater samples were collected from the wells. The disposable bailers or dedicated bladder pump were used to collect the groundwater samples from the monitoring wells. For each monitoring well, the groundwater samples were collected no more than two hours after purging was completed to prevent groundwater interaction with the monitoring well casing and atmosphere. Samples collected for dissolved lead were filtered in the field using a 0.45 micron filter.

2.2 ANALYTICAL RESULTS

The samples were analyzed for TPH-d using U.S. Environmental Protection Agency [EPA] Method 8015M, TPH-g and Volatile Organic Compounds [VOCs] using EPA Method 8260B, Polycyclic Aromatic Hydrocarbons [PAHs] using EPA Method 8270C SIM, and dissolved lead using EPA Method 6020. The analytical results are described below and summarized in Table 2.1. A copy of the laboratory report is included in Appendix C.

- **HDMW2253-03** – None of the chemical constituents analyzed for were detected.

- **OWDFMW01** – TPH-d (17 and 15 µg/L), naphthalene (0.031 and 0.027 µg/L), and acetone (6.4 and 9.8 µg/L) were detected in both the primary and duplicate sample. None of the detected concentrations exceeded the DOH EALs.

- **RHMW04** – TPH-d (17 µg/L) was the only analyte detected. The TPH-d concentration detected did not exceed the DOH EALs.

Methylene chloride was detected (0.71 µg/L) in the trip blank submitted on July 23, 2014. Methylene chloride was not detected in any of the groundwater samples, and it is unlikely that this affects data usability.

2.2.1 Groundwater Contaminant Trends

The historical groundwater contaminant concentration trends for COPCs that exceed the DOH EALs are illustrated in Appendix D. A summary of groundwater contaminant trends is provided below.

- **HDMW2253-03** – No COPCs were detected during this round of quarterly sampling. With the exception of a possibly erroneous result obtained during the previous event in April 2014, TPH-d concentrations have not exceeded both DOH EALs in well HDMW2253-03 since January 2013 (600 µg/L).

- **OWDFMW01** – TPH-d was detected in both samples from this well at concentrations below DOH EALs. TPH-d concentrations in this well have been generally decreasing since an increase in November 2012. The TPH-d concentrations in the samples were below both DOH EALs for the first time since July 2012. Concentrations of all other COPCs detected during this round of quarterly sampling were consistent with historical data.

- **RHMW04** – TPH-d was detected in well RHMW04 at a concentration below the DOH EALs. This well had not been sampled since April 2010. TPH-d had never been detected in samples from this well; however, the laboratory LODs were an order of magnitude higher in the past and above both the concentration detected during this round and the current DOH EALs.

2.3 WASTE DISPOSAL

The purged groundwater and decontamination water generated during sampling of the wells were stored in a 55-gallon drum along with the purged water and decontamination water from the inside tunnel wells. The drum is currently stored onsite at ADIT 3 on top of a secondary containment spill pallet and covered by a tarp. There is a non-hazardous label affixed to the drum with all pertinent information relating to its generation. The drum will be used for future sampling events and will be properly disposed of once it has been filled.

TABLE 2.1
Analytical Results for Groundwater Sampling (July 23 and 24, 2014)
Red Hill Bulk Fuel Storage Facility
July 2014 Quarterly Monitoring Report

Method	Chemical	DOH EALs		OWDFMW01 (ES109)					OWDFMW01 (ES110) (Dup)					HDMW2253-03 (ES111)					RHMW04 (ES112)				
		Drinking Water Toxicity	Gross Contamination	Results	Q	LOQ	LOD	DL	Results	Q	LOQ	LOD	DL	Results	Q	LOQ	LOD	DL	Results	Q	LOQ	LOD	DL
EPA 8015B	TPH-d	190	100	17	HD,J	26	13	12	15	HD,J	25	12	11	N.D.	U	25	12	11	17	HD, J	25	12	11
EPA 8260B	TPH-g	100	100	N.D.	U	50	30	26	N.D.	U	50	30	26	N.D.	U	50	30	26	N.D.	U	50	30	26
EPA 8270C SIM	Acenaphthene	370	20	N.D.	U	0.2	0.051	0.021	N.D.	U	0.2	0.05	0.021	N.D.	U	0.2	0.053	0.021	N.D.	U	0.2	0.052	0.021
	Acenaphthylene	240	2,000	N.D.	U	0.2	0.051	0.018	N.D.	U	0.2	0.05	0.018	N.D.	U	0.2	0.053	0.018	N.D.	U	0.2	0.052	0.018
	Anthracene	1,800	22	N.D.	U	0.2	0.051	0.034	N.D.	U	0.2	0.05	0.034	N.D.	U	0.2	0.053	0.035	N.D.	U	0.2	0.052	0.035
	Benzo[a]anthracene	0.092	4.7	N.D.	U	0.2	0.051	0.024	N.D.	U	0.2	0.05	0.024	N.D.	U	0.2	0.053	0.024	N.D.	U	0.2	0.052	0.024
	Benzo[g,h,i]perylene	1,500	0.13	N.D.	U	0.2	0.051	0.022	N.D.	U	0.2	0.05	0.022	N.D.	U	0.2	0.053	0.022	N.D.	U	0.2	0.052	0.022
	Benzo[a]pyrene	0.2	0.81	N.D.	U	0.2	0.051	0.036	N.D.	U	0.2	0.05	0.036	N.D.	U	0.2	0.053	0.037	N.D.	U	0.2	0.052	0.037
	Benzo[b]fluoranthene	0.092	0.75	N.D.	U	0.2	0.051	0.025	N.D.	U	0.2	0.05	0.025	N.D.	U	0.2	0.053	0.025	N.D.	U	0.2	0.052	0.025
	Benzo[k]fluoranthene	0.92	0.4	N.D.	U	0.2	0.051	0.023	N.D.	U	0.2	0.05	0.023	N.D.	U	0.2	0.053	0.024	N.D.	U	0.2	0.052	0.024
	Chrysene	9.2	1	N.D.	U	0.2	0.051	0.019	N.D.	U	0.2	0.05	0.019	N.D.	U	0.2	0.053	0.019	N.D.	U	0.2	0.052	0.019
	Dibenzo[a,h]anthracene[1]	0.0092	0.52	N.D.	U	0.2	0.051	0.027	N.D.	U	0.2	0.05	0.027	N.D.	U	0.2	0.053	0.027	N.D.	U	0.2	0.052	0.027
	Fluoranthene	1,500	130	N.D.	U	0.2	0.051	0.027	N.D.	U	0.2	0.05	0.027	N.D.	U	0.2	0.053	0.028	N.D.	U	0.2	0.052	0.028
	Fluorene	240	950	N.D.	U	0.2	0.051	0.024	N.D.	U	0.2	0.05	0.024	N.D.	U	0.2	0.053	0.025	N.D.	U	0.2	0.052	0.025
	Indeno[1,2,3-cd]pyrene	0.092	0.095	N.D.	U	0.2	0.051	0.022	N.D.	U	0.2	0.05	0.022	N.D.	U	0.2	0.053	0.022	N.D.	U	0.2	0.052	0.022
	1,-Methylnaphthalene	4.7	10	N.D.	U	0.2	0.051	0.028	N.D.	U	0.2	0.05	0.028	N.D.	U	0.2	0.053	0.029	N.D.	U	0.2	0.052	0.029
	2,-Methylnaphthalene	24	10	N.D.	U	0.2	0.051	0.026	N.D.	U	0.2	0.05	0.027	N.D.	U	0.2	0.053	0.027	N.D.	U	0.2	0.052	0.027
	Naphthalene	17	21	0.031	J	0.2	0.051	0.023	0.027	J	0.2	0.05	0.023	N.D.	U	0.2	0.053	0.023	N.D.	U	0.2	0.052	0.023
	Phenanthrene	240	410	N.D.	U	0.2	0.051	0.030	N.D.	U	0.2	0.05	0.031	N.D.	U	0.2	0.053	0.031	N.D.	U	0.2	0.052	0.031
	Pyrene	180	68	N.D.	U	0.2	0.051	0.025	N.D.	U	0.2	0.05	0.025	N.D.	U	0.2	0.053	0.025	N.D.	U	0.2	0.052	0.025
EPA 8260B	1,1,1,2-Tetrachloroethane	0.52	50,000	N.D.	U	1.0	0.5	0.40	N.D.	U	1.0	0.5	0.40	N.D.	U	1.0	0.5	0.40	N.D.	U	1.0	0.5	0.40
	1,1,2,2-Tetrachloroethane[1]	0.067	500	N.D.	U	1.0	0.5	0.41	N.D.	U	1.0	0.5	0.41	N.D.	U	1.0	0.5	0.41	N.D.	U	1.0	0.5	0.41
	1,1,1-Trichloroethane	200	970	N.D.	U	5.0	0.5	0.30	N.D.	U	5.0	0.5	0.30	N.D.	U	5.0	0.5	0.30	N.D.	U	5.0	0.5	0.30
	1,1,2-Trichloroethane	5	50,000	N.D.	U	1.0	0.5	0.38	N.D.	U	1.0	0.5	0.38	N.D.	U	1.0	0.5	0.38	N.D.	U	1.0	0.5	0.38
	1,1-Dichloroethane	2.4	50,000	N.D.	U	5.0	0.5	0.28	N.D.	U	5.0	0.5	0.28	N.D.	U	5.0	0.5	0.28	N.D.	U	5.0	0.5	0.28
	1,1-Dichloroethylene	7	1,500	N.D.	U	1.0	0.5	0.43	N.D.	U	1.0	0.5	0.43	N.D.	U	1.0	0.5	0.43	N.D.	U	1.0	0.5	0.43
	1,2,3-Trichloropropane[1]	0.6	50,000	N.D.	U	5.0	1.0	0.64	N.D.	U	5.0	1.0	0.64	N.D.	U	5.0	1.0	0.64	N.D.	U	5.0	1.0	0.64
	1,2,4-Trichlorobenzene	70	3,000	N.D.	U	5.0	1.0	0.5	N.D.	U	5.0	1.0	0.5	N.D.	U	5.0	1.0	0.5	N.D.	U	5.0	1.0	0.5
	1,2-Dibromo-3- chloropropane[1]	0.04	10	N.D.	U	10	2.0	1.2	N.D.	U	10	2.0	1.2	N.D.	U	10	2.0	1.2	N.D.	U	10	2.0	1.2
	1,2-Dibromoethane[1]	0.04	50,000	N.D.	U	1.0	0.5	0.36	N.D.	U	1.0	0.5	0.36	N.D.	U	1.0	0.5	0.36	N.D.	U	1.0	0.5	0.36
	1,2-Dichlorobenzene	600	10	N.D.	U	1.0	0.5	0.46	N.D.	U	1.0	0.5	0.46	N.D.	U	1.0	0.5	0.46	N.D.	U	1.0	0.5	0.46
	1,2-Dichloroethane[1]	0.15	7,000	N.D.	U	1.0	0.5	0.24	N.D.	U	1.0	0.5	0.24	N.D.	U	1.0	0.5	0.24	N.D.	U	1.0	0.5	0.24
	1,2-Dichloropropane	5	10	N.D.	U	5.0	0.5	0.42	N.D.	U	5.0	0.5	0.42	N.D.	U	5.0	0.5	0.42	N.D.	U	5.0	0.5	0.42
	1,3-Dichlorobenzene	180	5	N.D.	U	1.0	0.5	0.4	N.D.	U	1.0	0.5	0.4	N.D.	U	1.0	0.5	0.4	N.D.	U	1.0	0.5	0.4
	1,3-Dichloropropene (total of cis/trans)[1]	0.43	50,000	N.D.	U	1.0	0.5	0.25	N.D.	U	1.0	0.5	0.25	N.D.	U	1.0	0.5	0.25	N.D.	U	1.0	0.5	0.25
	1,4-Dichlorobenzene	75	5	N.D.	U	1.0	0.5	0.43	N.D.	U	1.0	0.5	0.43	N.D.	U	1.0	0.5	0.43	N.D.	U	1.0	0.5	0.43
	Acetone	22,000	20,000	6.4	J,IH,ICH	20	10	6.0	9.8	J,IH,ICH	20	10	6.0	N.D.	U,IH,ICH	20	10	6.0	N.D.	U,IH,ICH	20	10	6.0
	Benzene	5	170	N.D.	U	1.0	0.5	0.14	N.D.	U	1.0	0.5	0.14	N.D.	U	1.0	0.5	0.14	N.D.	U	1.0	0.5	0.14
	Bromodichloromethane[1]	0.12	50,000	N.D.	U	5.0	0.5	0.21	N.D.	U	5.0	0.5	0.21	N.D.	U	5.0	0.5	0.21	N.D.	U	5.0	0.5	0.21
	Bromoform	80	510	N.D.	U	10	1.0	0.50	N.D.	U	10	1.0	0.50	N.D.	U	10	1.0	0.50	N.D.	U	10	1.0	0.50
	Bromomethane	8.7	50,000	N.D.	U	20	5.0	3.9	N.D.	U	20	5.0	3.9	N.D.	U	20	5.0	3.9	N.D.	U	20	5.0	3.9
	Carbon Tetrachloride	5	520	N.D.	U	1.0	0.5	0.23	N.D.	U	1.0	0.5	0.23	N.D.	U	1.0	0.5	0.23	N.D.	U	1.0	0.5	0.23
	Chlorobenzene	100	50	N.D.	U	5.0	0.5	0.17	N.D.	U	5.0	0.5	0.17	N.D.	U	5.0	0.5	0.17	N.D.	U	5.0	0.5	0.17
	Chloroethane	21,000	16	N.D.	U	10	5.0	2.3	N.D.	U	10	5.0	2.3	N.D.	U	10	5.0	2.3	N.D.	U	10	5.0	2.3
	Chloroform	70	2,400	N.D.	U	5.0	0.5	0.46	N.D.	U	5.0	0.5	0.46	N.D.	U	5.0	0.5	0.46	N.D.	U	5.0	0.5	0.46
	Chloromethane[1]	1.8	50,000	N.D.	U	10	2.0	1.8	N.D.	U	10	2.0	1.8	N.D.	U	10	2.0	1.8	N.D.	U	10	2.0	1.8
	cis-1,2-Dichloroethylene	70	50,000	N.D.	U	1.0	0.5	0.48	N.D.	U	1.0	0.5	0.48	N.D.	U	1.0	0.5	0.48	N.D.	U	1.0	0.5	0.48
	Dibromochloromethane[1]	0.16	50,000	N.D.	U	1.0	0.5	0.25	N.D.	U	1.0	0.5	0.25	N.D.	U	1.0	0.5	0.25	N.D.	U	1.0	0.5	0.25
	Ethylbenzene	700	30	N.D.	U	1.0	0.5	0.14	N.D.	U	1.0	0.5	0.14	N.D.	U	1.0	0.5	0.14	N.D.	U	1.0	0.5	0.14
	Hexachlorobutadiene	0.86	6	N.D.	U	1.0	0.5	0.32	N.D.	U	1.0	0.5	0.32	N.D.	U	1.0	0.5	0.32	N.D.	U	1.0	0.5	0.32
	Methyl ethyl ketone (2-Butanone)	7,100	8,400	N.D.	U	10	5.0	2.2	N.D.	U	10	5.0	2.2	N.D.	U	10	5.0	2.2	N.D.	U	10	5.0	2.2
	Methyl isobutyl ketone (4-Methyl-2-Pentanone)	2,000	1300	N.D.	U	10	5.0	4.4	N.D.	U	10	5.0	4.4	N.D.	U	10	5.0	4.4	N.D.	U	10	5.0	4.4
	Methyl tert-butyl Ether	12	5	N.D.	U	1.0	0.5	0.31	N.D.	U	1.0	0.5	0.31	N.D.	U	1.0	0.5	0.31	N.D.	U	1.0	0.5	0.31
	Methylene chloride	4.8	9,100	N.D.	U	5.0	1.0	0.64	N.D.	U	5.0	1.0	0.64	N.D.	U	5.0	1.0	0.64	N.D.	U	5.0	1.0	0.64
	Styrene	100	10	N.D.	U	1.0	0.5	0.17	N.D.	U	1.0	0.5	0.17	N.D.	U	1.0	0.5	0.17	N.D.	U	1.0	0.5	0.17
	Tetrachloroethylene	5	170	N.D.	U	5.0	0.5	0.39	N.D.	U	5.0	0.5	0.39	N.D.	U	5.0	0.5	0.39	N.D.	U	5.0	0.5	0.39
	Toluene	1,000	40	N.D.	U	1.0	0.5	0.24	N.D.	U	1.0	0.5	0.24	N.D.	U	1.0	0.5	0.24	N.D.	U	1.0	0.5	0.24
	trans-1,2- Dichloroethylene	100	260	N.D.	U	1.0	0.5	0.37	N.D.	U	1.0	0.5	0.37	N.D.	U	1.0	0.5	0.37	N.D.	U	1.0	0.5	0.37
	Trichloroethylene	5	310	N.D.	U	1.0	0.5	0.37	N.D.	U	1.0	0.5	0.37	N.D.	U	1.0	0.5	0.37	N.D.	U	1.0	0.5	0.37
	Vinyl chloride	2	3,400	N.D.	U	1.0	0.5	0.30	N.D.	U	1.0	0.5	0.30	N.D.	U	1.0	0.5	0.30	N.D.	U	1.0	0.5	0.30
	Xylenes	10,000	20	N.D.	U	11	1.5	0.23	N.D.	U	11	1.5	0.23	N.D.	U	11	1.5	0.23	N.D.	U	11	1.5	0.23
EPA 6020	Dissolved Lead	15	50,000	N.D.	J	1.0	0.2	0.0898	N.D.	U	1.0	0.2	0.0898	N.D.	U	1.0	0.2	0.0898	N.D.	U	1.0	0.2	0.0898

The data are in micrograms per liter (µg/L). Shaded values exceeded the DOH EALs.

[1] LOD for this analyte exceeds the DOH EAL

B Analyte was present in the associated method blank.

DOH EALs DOH Tier 1 Environmental Action Levels for groundwater where groundwater is a current drinking water source and surface water is greater than 150 meters from the site (DOH, Fall 2011).

DL Detection Limit or Method Detection Limit (MDL)

EPA Environmental Protection Agency

HD The chromatographic pattern was inconsistent with the profile of the reference fuel standard.

ICH Initial calibration verification recovery is above the control limit for this analyte.

IH Calibration verification recovery is above the control limit for this analyte.

J Analyte was detected at a concentration below the LOQ and above the DL. Reported value is estimated.

LOQ Limit of Quantitation

LOD Limit of Detection

N.D. Not Detected

Q Qualifiers

TPH-g Total Petroleum Hydrocarbons as gasoline

TPH-d Total Petroleum Hydrocarbons as diesel

U Undetected at DL and is reported as less than the LOD.

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SECTION 3 – DATA QUALITY ASSESSMENT

A data quality assessment, which consists of a review of the overall groundwater sample collection and analysis process, was performed in order to determine whether the analytical data generated met the quality objectives for the project. The data quality assessment was performed in accordance with the approved WP/SAP (ESI, 2012). The field Quality Control [QC] program consisted of standardized sample collection and management procedures, and the collection of field duplicate samples, matrix spike samples, and trip blank samples. The laboratory quality assurance program consisted of the use of standard analytical methods and the preparation and analyses of Matrix Spike [MS]/Matrix Spike Duplicate [MSD] samples, surrogate spikes, blanks, and Laboratory Control Samples [LCSs]/Laboratory Control Sample Duplicates [LCSDs].

3.1 DATA VALIDATION AND ASSESSMENT

The objective of data validation is to provide data of known quality for project decisions. Data quality is judged in terms of Precision, Accuracy, Representativeness, Completeness, Comparability, and Sensitivity [PARCCS]. A number of factors may affect the quality of data, including: sample collection methods, sample analysis methods, and adherence to established procedures for sample collection, preservation, management, shipment, and analysis.

Precision

Precision is defined as the reproducibility of replicate measurements. Precision is evaluated by Relative Percentage Difference [RPD] of field duplicates, LCS/LCSD, and MS/MSD results. Field duplicate and MS/MSD samples were collected at a rate of approximately 10% of project samples. Field duplicates were sent to the laboratory along with the primary samples.

The RPDs of detected analytes for the primary and field duplicate samples (ES109 and ES110) are provided in Table 3.1. A precision of less than 50% for duplicate pairs is required by the DoN Project Procedures Manual to be considered acceptable (DoN 2007). For this monitoring event, the RPDs for duplicate sample pairs all met acceptance criteria. In addition, all RPDs for MS/MSD and LCS/LCSD pairs were also below the control limit.

Accuracy

Accuracy is defined as the degree of conformity of a measurement to a standard or true value. Accuracy is evaluated through measurement of the percent recovery of an analyte in a reference standard or spiked sample. Accuracy limits for surrogates, laboratory control spike, MS, and MSD samples are established by the individual laboratory. The acceptance criteria for accuracy are dependent on the analytical method and are based on historical laboratory data.

Between August 2009 and July 2010, naphthalene was analyzed for by both EPA Methods 8260B and 8270C, and beginning in October 2010, only results using EPA Method 8270C were reported. Naphthalene was not detected in groundwater from either well HDMW2253-03 or OWDFMW01 until November 2012 and has never been detected in RHMW04; however, when

both methods were used for samples collected from inside well RHMW02, concentrations of naphthalene detected by EPA Method 8260B were generally two to three times higher than those detected by EPA Method 8270C. We assume this is due to the better preservation of VOCs associated with the use of EPA Method 8260B. This suggests that the naphthalene results provided by EPA Method 8270C may be biased low. Naphthalene concentrations in samples collected beginning in October 2010 were analyzed using EPA Method 8270C and results may be biased low. However, naphthalene concentrations in project samples have been orders of magnitude below DOH EALs, and this potential low bias should not affect project decisions.

Results for TPH-d in samples ES109, ES110, and ES112 were flagged "HD." The laboratory indicated a mismatch between the calibration standard and the TPH-d chromatographic profile. Mismatches of this type are not uncommon, and may indicate decreased accuracy in the TPH-d result.

All of the LCS and surrogate spike recoveries for analyzed constituents were within acceptable percent recovery limits, except for the LCS percent recoveries for acetone (193% and 201%). Acetone was detected in groundwater samples; however, concentrations detected were three orders of magnitude below the DOH EALs. Thus, a potential high bias is unlikely to affect project decisions.

The MS and MSD recoveries were below the control limits for naphthalene and 1-methylnapthalene, and the MSD recovery was below the control limit for 2-methylnapthalene; however the sample that the MS/MSD was performed on was not a project sample, and the LCS/LCSD recoveries for naphthalene, 1-methylnapthalene, and 2-methylnapthalene were within the control limits, indicating the low MS/MSD recoveries are not indicative of a laboratory issue. As the MS/MSD was not performed on a project sample, the evaluation of matrix effects is not applicable to this project and does not affect data usability. The MS and MSD recoveries were also below the control limits for 1,1,2,2-tetrachloroethane. Results for this analyte may be biased low; however, 1,1,2,2-tetrachloroethane has never historically been detected during this project in any well. The MS and/or MSD recoveries were above the control limits for acetone and trichloroethene; the associated sample results may be biased high. Neither of these COPCs were detected at concentrations above the DOH EALs, so a potential high bias should not affect data usability.

All other MS/MSD recoveries were within acceptable recovery limits; therefore, the data accuracy for this monitoring event is considered acceptable.

Representativeness

Representativeness is the degree to which data accurately and precisely represents a characteristic of a population, parameter variations at a sampling point, or an environmental condition. Representativeness was achieved by conducting sampling in accordance with the sample collection procedures described in the project WP/SAP, including standardized sample collection methods (ESI, 2012).

Representativeness is also evaluated through the compliance with the standardized sample holding time and sample preservation methods, and through the analysis of blank samples, including method blank and trip blank samples. For this sampling event, all sample holding time and sample preservation were consistent with EPA guidance.

For this sampling event, one trip blank was included in every cooler containing samples for VOC and TPH-g analysis to assess the potential for contamination during sample transport. Two trip blanks were collected. Methylene chloride was the only COPC detected, and in only one of the trip blanks (0.71 µg/L), at a concentration below the LOD, indicating potential contamination during handling or transport. Because methylene chloride was not detected in any of the project groundwater samples, this QC exceedance does not constitute a significant problem and is considered insignificant. Based on the assessment of representativeness, the groundwater sample data are considered representative of the groundwater quality at the site. A summary of the trip blank results is provided in Table 3.1.

Completeness

Completeness is defined as the overall percentage of valid analytical results (including estimated results) compared to the total number of analytical results reported by the laboratory. No data were rejected for this project, and therefore the completeness goal for this project (90%) was successfully met.

Comparability

Comparability expresses the confidence with which one data set can be compared to another data set. Comparability can be related to accuracy and precision because these quantities are measures of data reliability. Data with acceptable precision and accuracy are considered comparable if collection techniques, analytical procedures, methods and reporting are equivalent. For this monitoring event, the samples were collected using approaches consistent with those in the previous events, and the same analytical methods/procedures were used to measure the concentration of COPCs. Therefore, the results are considered comparable within this data set and with the data collected from previous sampling events. The field and laboratory personnel followed standard operating procedures.

As discussed above, between August 2009 and July 2010, naphthalene was analyzed for by both EPA Methods 8260B and 8270C, and beginning in October 2010, only results using EPA Method 8270C were reported. Naphthalene concentrations obtained using EPA Method 8270C may be biased low; however, naphthalene was not detected in groundwater from either well HDMW2253-03 or OWDFMW01 until November 2012 and has never been detected in RHMW04, so comparability with older results should not be a concern. If naphthalene concentrations increase, the low bias associated with Method 8270C should be considered when making project decisions.

All project samples for TPH-g analysis through July 2010 were analyzed by EPA Method 8015; beginning in October 2010, EPA Method 8260B was used. There was no event where both methods were used, and so there is no way to directly compare the results using each method

and determine if one method produces biased results. However, there is no reason to believe that using either method should bias the data, and the TPH-g data for all events should be comparable.

Sensitivity

The LOQs are established by the laboratory based on the LODs or instrument detection limits, historical data, and EPA limits established for the various methods. The LOQs for samples may require adjustment due to matrix interference or if high levels of target analytes necessitate dilution before analysis. Matrix interference and sample dilutions have the effect of decreasing sensitivity and increasing the LOQs. Laboratory LODs and LOQs for several analytes (EPA Methods 8260 and 8270) for this event differed from the LODs and LOQs in the WP/SAP because the laboratory updates them quarterly and in some cases, dilution was necessary due to the presence of high concentrations of analytes.

For this event, LODs and LOQs for several analytes were greater than the DOH EALs (as stated in the WP/SAP) and therefore it is not possible to determine whether the analytes are present at concentrations greater than or equal to the DOH EALs. The lack of the required sensitivity should be considered when making project decisions. The affected analytes for this monitoring event are 1,2,3-trichloropropane, 1,2-dibromo-3-chloropropane, 1,2-dibromoethane, 1,2-dichloroethane, 1,3-dichloropropene, bromodichloromethane, chloromethane, dibromochloromethane, 1,1,2,2-tetrachloroethane, and dibenzo[a,h]anthracene.

3.2 Data Assessment and Usability Conclusions

The PARCCS criteria were evaluated, and with a few exceptions, all criteria were met. These exceptions include low MS/MSD recoveries for naphthalene, 1-methylnapthalene, 1,1,2,2-tetrachloroethane, and high MS/MSD recoveries for acetone and trichloroethene. Acetone recoveries in the LCS were also high. As discussed above, for naphthalene and 1-methylnapthalene, the MS/MSD was not performed on a sample from this project and is not applicable to the evaluation of matrix effects. Trichloroethene. and 1,1,2,2-tetrachloroethane were not detected in groundwater samples during this event and have not been historically detected, so biases to the associated result should not be a significant issue. Acetone was detected in groundwater samples; however, concentrations detected were three orders of magnitude below the DOH EALs, and this potential high bias is unlikely to affect project decisions. The data assessment concludes that all data generated during this event are usable for their intended purpose.

TABLE 3.1
Quality Control Results for Groundwater Sampling (July 23 and 24, 2014)
Red Hill Bulk Fuel Storage Facility
July 2014 Quarterly Monitoring Report

Method	Chemical Constituent	DOH EALs		OWDFMW01 (ES109)					OWDFMW01 (ES110) (DUP)					RPD Duplicate (%)	ES Trip				
		Drinking Water Toxicity	Gross Contamination	Results	Q	LOQ	LOD	DL	Results	Q	LOQ	LOD	DL		Results	Q	LOQ	LOD	DL
EPA 8015B	TPH-d	190	100	17	HD,J	26	13	12	15	HD,J	25	12	11	12.50	-	-	-	-	-
EPA 8260B	TPH-g	100	100	N.D.	U	50	30	26	N.D.	U	50	30	26	NA	N.D.	U	50	30	26
EPA 8270C SIM	Acenaphthene	370	20	N.D.	U	0.2	0.051	0.021	N.D.	U	0.2	0.05	0.021	NA	-	-	-	-	-
	Acenaphthylene	240	2,000	N.D.	U	0.2	0.051	0.018	N.D.	U	0.2	0.05	0.018	NA	-	-	-	-	-
	Anthracene	1,800	22	N.D.	U	0.2	0.051	0.034	N.D.	U	0.2	0.05	0.034	NA	-	-	-	-	-
	Benzo[a]anthracene	0.092	4.7	N.D.	U	0.2	0.051	0.024	N.D.	U	0.2	0.05	0.024	NA	-	-	-	-	-
	Benzo[g,h,i]perylene	1,500	0.13	N.D.	U	0.2	0.051	0.022	N.D.	U	0.2	0.05	0.022	NA	-	-	-	-	-
	Benzo[a]pyrene	0.2	0.81	N.D.	U	0.2	0.051	0.036	N.D.	U	0.2	0.05	0.036	NA	-	-	-	-	-
	Benzo[b]fluoranthene	0.092	0.75	N.D.	U	0.2	0.051	0.025	N.D.	U	0.2	0.05	0.025	NA	-	-	-	-	-
	Benzo[k]fluoranthene	0.92	0.4	N.D.	U	0.2	0.051	0.023	N.D.	U	0.2	0.05	0.023	NA	-	-	-	-	-
	Chrysene	9.2	1	N.D.	U	0.2	0.051	0.019	N.D.	U	0.2	0.05	0.019	NA	-	-	-	-	-
	Dibenzo[a,h]anthracene	0.0092	0.52	N.D.	U	0.2	0.051	0.027	N.D.	U	0.2	0.05	0.027	NA	-	-	-	-	-
	Fluoranthene	1,500	130	N.D.	U	0.2	0.051	0.027	N.D.	U	0.2	0.05	0.027	NA	-	-	-	-	-
	Fluorene	240	950	N.D.	U	0.2	0.051	0.024	N.D.	U	0.2	0.05	0.024	NA	-	-	-	-	-
	Indeno[1,2,3-cd]pyrene	0.092	0.095	N.D.	U	0.2	0.051	0.022	N.D.	U	0.2	0.05	0.022	NA	-	-	-	-	-
	1,-Methylnaphthalene	4.7	10	N.D.	U	0.2	0.051	0.028	N.D.	U	0.2	0.05	0.028	NA	-	-	-	-	-
	2,-Methylnaphthalene	24	10	N.D.	U	0.2	0.051	0.026	N.D.	U	0.2	0.05	0.027	NA	-	-	-	-	-
	Naphthalene	17	21	0.031	J	0.2	0.051	0.023	0.027	J	0.2	0.05	0.023	13.79	-	-	-	-	-
	Phenanthrene	240	410	N.D.	U	0.2	0.051	0.030	N.D.	U	0.2	0.05	0.031	NA	-	-	-	-	-
	Pyrene	180	68	N.D.	U	0.2	0.051	0.025	N.D.	U	0.2	0.05	0.025	NA	-	-	-	-	-
EPA 8260B	1,1,1,2-Tetrachloroethane	0.52	50,000	N.D.	U	1.0	0.5	0.40	N.D.	U	1.0	0.5	0.40	NA	N.D.	U	1.0	0.5	0.40
	1,1,2,2-Tetrachloroethane	0.067	500	N.D.	U	1.0	0.5	0.41	N.D.	U	1.0	0.5	0.41	NA	N.D.	U	1.0	0.5	0.41
	1,1,1-Trichloroethane	200	970	N.D.	U	5.0	0.5	0.30	N.D.	U	5.0	0.5	0.30	NA	N.D.	U	5.0	0.5	0.30
	1,1,2-Trichloroethane	5	50,000	N.D.	U	1.0	0.5	0.38	N.D.	U	1.0	0.5	0.38	NA	N.D.	U	1.0	0.5	0.38
	1,1-Dichloroethane	2.4	50,000	N.D.	U	5.0	0.5	0.28	N.D.	U	5.0	0.5	0.28	NA	N.D.	U	5.0	0.5	0.28
	1,1-Dichloroethylene	7	1,500	N.D.	U	1.0	0.5	0.43	N.D.	U	1.0	0.5	0.43	NA	N.D.	U	1.0	0.5	0.43
	1,2,3-Trichloropropane	0.6	50,000	N.D.	U	5.0	1.0	0.64	N.D.	U	5.0	1.0	0.64	NA	N.D.	U	5.0	1.0	0.64
	1,2,4-Trichlorobenzene	70	3,000	N.D.	U	5.0	1.0	0.5	N.D.	U	5.0	1.0	0.5	NA	N.D.	U	5.0	1.0	0.5
	1,2-Dibromo-3- chloropropane	0.04	10	N.D.	U	10	2.0	1.2	N.D.	U	10	2.0	1.2	NA	N.D.	U	10	2.0	1.2
	1,2-Dibromoethane	0.04	50,000	N.D.	U	1.0	0.5	0.36	N.D.	U	1.0	0.5	0.36	NA	N.D.	U	1.0	0.5	0.36
	1,2-Dichlorobenzene	600	10	N.D.	U	1.0	0.5	0.46	N.D.	U	1.0	0.5	0.46	NA	N.D.	U	1.0	0.5	0.46
	1,2-Dichloroethane	0.15	7,000	N.D.	U	1.0	0.5	0.24	N.D.	U	1.0	0.5	0.24	NA	N.D.	U	1.0	0.5	0.24
	1,2-Dichloropropane	5	10	N.D.	U	5.0	0.5	0.42	N.D.	U	5.0	0.5	0.42	NA	N.D.	U	5.0	0.5	0.42
	1,3-Dichlorobenzene	180	5	N.D.	U	1.0	0.5	0.4	N.D.	U	1.0	0.5	0.4	NA	N.D.	U	1.0	0.5	0.4
	1,3-Dichloropropene (total of cis/trans)	0.43	50,000	N.D.	U	1.0	0.5	0.25	N.D.	U	1.0	0.5	0.25	NA	N.D.	U	1.0	0.5	0.25
	1,4-Dichlorobenzene	75	5	N.D.	U	1.0	0.5	0.43	N.D.	U	1.0	0.5	0.43	NA	N.D.	U	1.0	0.5	0.43
	Acetone	22,000	20,000	6.4	J,IH,ICH	20	10	6.0	9.8	J,IH,ICH	20	10	6.0	41.98	N.D.	U,IH,ICH	20	10	6.0
	Benzene	5	170	N.D.	U	1.0	0.5	0.14	N.D.	U	1.0	0.5	0.14	NA	N.D.	U	1.0	0.5	0.14
	Bromodichloromethane	0.12	50,000	N.D.	U	5.0	0.5	0.21	N.D.	U	5.0	0.5	0.21	NA	N.D.	U	5.0	0.5	0.21
	Bromoform	80	510	N.D.	U	10	1.0	0.50	N.D.	U	10	1.0	0.50	NA	N.D.	U	10	1.0	0.50
	Bromomethane	8.7	50,000	N.D.	U	20	5.0	3.9	N.D.	U	20	5.0	3.9	NA	N.D.	U	20	5.0	3.9
	Carbon Tetrachloride	5	520	N.D.	U	1.0	0.5	0.23	N.D.	U	1.0	0.5	0.23	NA	N.D.	U	1.0	0.5	0.23
	Chlorobenzene	100	50	N.D.	U	5.0	0.5	0.17	N.D.	U	5.0	0.5	0.17	NA	N.D.	U	5.0	0.5	0.17
	Chloroethane	21,000	16	N.D.	U	10	5.0	2.3	N.D.	U	10	5.0	2.3	NA	N.D.	U	10	5.0	2.3
	Chloroform	70	2,400	N.D.	U	5.0	0.5	0.46	N.D.	U	5.0	0.5	0.46	NA	N.D.	U	5.0	0.5	0.46
	Chloromethane	1.8	50,000	N.D.	U	10	2.0	1.8	N.D.	U	10	2.0	1.8	NA	N.D.	U,	10	2.0	1.8
	cis-1,2-Dichloroethylene	70	50,000	N.D.	U	1.0	0.5	0.48	N.D.	U	1.0	0.5	0.48	NA	N.D.	U	1.0	0.5	0.48
	Dibromochloromethane	0.16	50,000	N.D.	U	1.0	0.5	0.25	N.D.	U	1.0	0.5	0.25	NA	N.D.	U	1.0	0.5	0.25
	Ethylbenzene	700	30	N.D.	U	1.0	0.5	0.14	N.D.	U	1.0	0.5	0.14	NA	N.D.	U	1.0	0.5	0.14
	Hexachlorobutadiene	0.86	6	N.D.	U	1.0	0.5	0.32	N.D.	U	1.0	0.5	0.32	NA	N.D.	U	1.0	0.5	0.32
	Methyl ethyl ketone (2-Butanone)	7,100	8,400	N.D.	U	10	5.0	2.2	N.D.	U	10	5.0	2.2	NA	N.D.	U	10	5.0	2.2
	Methyl isobutyl ketone (4-Methyl-2-Pentanone)	2,000	1300	N.D.	U	10	5.0	4.4	N.D.	U	10	5.0	4.4	NA	N.D.	U	10	5.0	4.4
	Methyl tert-butyl Ether	12	5	N.D.	U	1.0	0.5	0.31	N.D.	U	1.0	0.5	0.31	NA	N.D.	U	1.0	0.5	0.31
	Methylene chloride	4.8	9,100	N.D.	U	5.0	1.0	0.64	N.D.	U	5.0	1.0	0.64	NA	N.D.	U	5.0	1.0	0.64
	Styrene	100	10	N.D.	U	1.0	0.5	0.17	N.D.	U	1.0	0.5	0.17	NA	N.D.	U	1.0	0.5	0.17
	Tetrachloroethylene	5	170	N.D.	U	5.0	0.5	0.39	N.D.	U	5.0	0.5	0.39	NA	N.D.	U	5.0	0.5	0.39
	Toluene	1,000	40	N.D.	U	1.0	0.5	0.24	N.D.	U	1.0	0.5	0.24	NA	N.D.	U	1.0	0.5	0.24
	trans-1,2- Dichloroethylene	100	260	N.D.	U	1.0	0.5	0.37	N.D.	U	1.0	0.5	0.37	NA	N.D.	U	1.0	0.5	0.37
	Trichloroethylene	5	310	N.D.	U	1.0	0.5	0.37	N.D.	U	1.0	0.5	0.37	NA	N.D.	U	1.0	0.5	0.37
	Vinyl chloride	2	3,400	N.D.	U	1.0	0.5	0.30	N.D.	U	1.0	0.5	0.30	NA	N.D.	U	1.0	0.5	0.30
	Xylenes	10,000	20	N.D.	U	11	1.5	0.23	N.D.	U	11	1.5	0.23	NA	N.D.	U	11	1.5	0.23
EPA 6020	Dissolved Lead	15	50,000	N.D.	J	1.0	0.2	0.0898	N.D.	U	1.0	0.2	0.0898	NA	-	-	-	-	-

The data are in micrograms per liter (µg/L). Shaded values exceeded the DOH EALs.

B	Analyte was present in the associated method blank.
DOH EALs	DOH Tier 1 Environmental Action Levels for groundwater where groundwater is a current drinking water source and surface water is greater than 150 meters from the site (DOH, Fall 2011).
DL	Detection Limit or Method Detection Limit (MDL)
EPA	Environmental Protection Agency
HD	The chromatographic pattern was inconsistent with the profile of the reference fuel standard.
ICH	Initial calibration verification recovery is above the control limit for this analyte.
IH	Calibration verification recovery is above the control limit for this analyte.
J	Analyte was detected at a concentration below the LOQ and above the DL. Reported value is estimated.
LOD	Limit of Detection
LOQ	Limit of Quantitation
NA	Both results for duplicate pair were non-detect, no RPD calculations
N.D.	Not Detected
Q	Qualifiers
TPH-g	Total Petroleum Hydrocarbons as gasoline
TPH-d	Total Petroleum Hydrocarbons as diesel
U	Undetected at DL and is reported as less than the LOD.

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SECTION 4 – SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

This quarterly monitoring report presents the results of groundwater sampling conducted on July 23 and 24, 2014, at the RHSF, JBPHH, Hawaii. The RHSF is located in Halawa Heights on the Island of Oahu. The DOH Facility ID number for the RHSF is 9-102271. The DOH Release ID numbers are 990051, 010011, 020028, and 140010.

The groundwater sampling was conducted as part of the long-term groundwater and soil vapor monitoring at the RHSF, under NAVFAC Contract Number N62742-12-D-1853. The sampling was conducted in accordance with the approved WP/SAP prepared by ESI.

ESI personnel collected groundwater samples from three monitoring wells (wells HDMW2253-03, OWDFMW01, and RHMW04). A primary and duplicate groundwater sample were collected from well OWDFMW01. A summary of the analytical results is provided below.

- **HDMW2253-03** – None of the chemical constituents analyzed for were detected.

- **OWDFMW01** – TPH-d (17 and 15 µg/L), naphthalene (0.031 and 0.027 µg/L), and acetone (6.4 and 9.8 µg/L) were detected in both the primary and duplicate sample. None of the detected concentrations exceeded the DOH EALs.

- **RHMW04** – TPH-d (17 µg/L) was the only analyte detected. The TPH-d concentration detected did not exceed the DOH EALs.

Methylene chloride was detected (0.71 µg/L) in the trip blank submitted on July 23, 2014. Methylene chloride was not detected in any of the groundwater samples, and it is unlikely that this affects data usability.

Groundwater Contaminant Trends

Historical groundwater contaminant concentration trends of COPCs that exceeded the DOH EALs are presented in Appendix D. A summary of groundwater contaminant trends is provided below.

- **HDMW2253-03** – No COPCs were detected during this round of quarterly sampling. With the exception of a possibly erroneous result obtained during the previous event in April 2014, TPH-d concentrations have not exceeded both DOH EALs in well HDMW2253-03 since January 2013 (600 µg/L).

- **OWDFMW01** – TPH-d was detected in both samples from this well at concentrations below DOH EALs. TPH-d concentrations in this well have been generally decreasing since an increase in November 2012. The TPH-d concentrations in the samples were below both DOH EALs for the first time since July 2012. Concentrations of all other COPCs detected during this round of quarterly sampling were consistent with historical data.

- **RHMW04** – TPH-d was detected in well RHMW04 at a concentration below the DOH EALs. This well had not been sampled since April 2010. TPH-d had never been detected in samples from this well; however, the laboratory limits of detection (LODs) were an order of magnitude higher in the past and above both the concentration detected during this round and the current DOH EALs.

Conclusions and Recommendations

Since the wells were last sampled (April 2014 for wells HDMW2253-03 and OWDFMW01; and April 2010 for well RHMW04), groundwater contaminant concentrations remained at low concentrations and did not change significantly, or were not detected. No COPCs were detected at concentrations above the DOH EALs.

Based on the results of the assessment, continued groundwater monitoring at the RHSF is recommended. If the TPH-d concentrations significantly increase, the monitoring frequency should be increased to monthly, even though wells RHMW04, HDMW2253-03, and OWDFMW01 are not included in the RHSF Groundwater Protection Plan.

SECTION 5 – FUTURE WORK

Future work includes the fourth quarter 2014 groundwater monitoring, which is tentatively scheduled for October 2014. A quarterly groundwater monitoring report will be prepared to document the sampling event

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FIGURES

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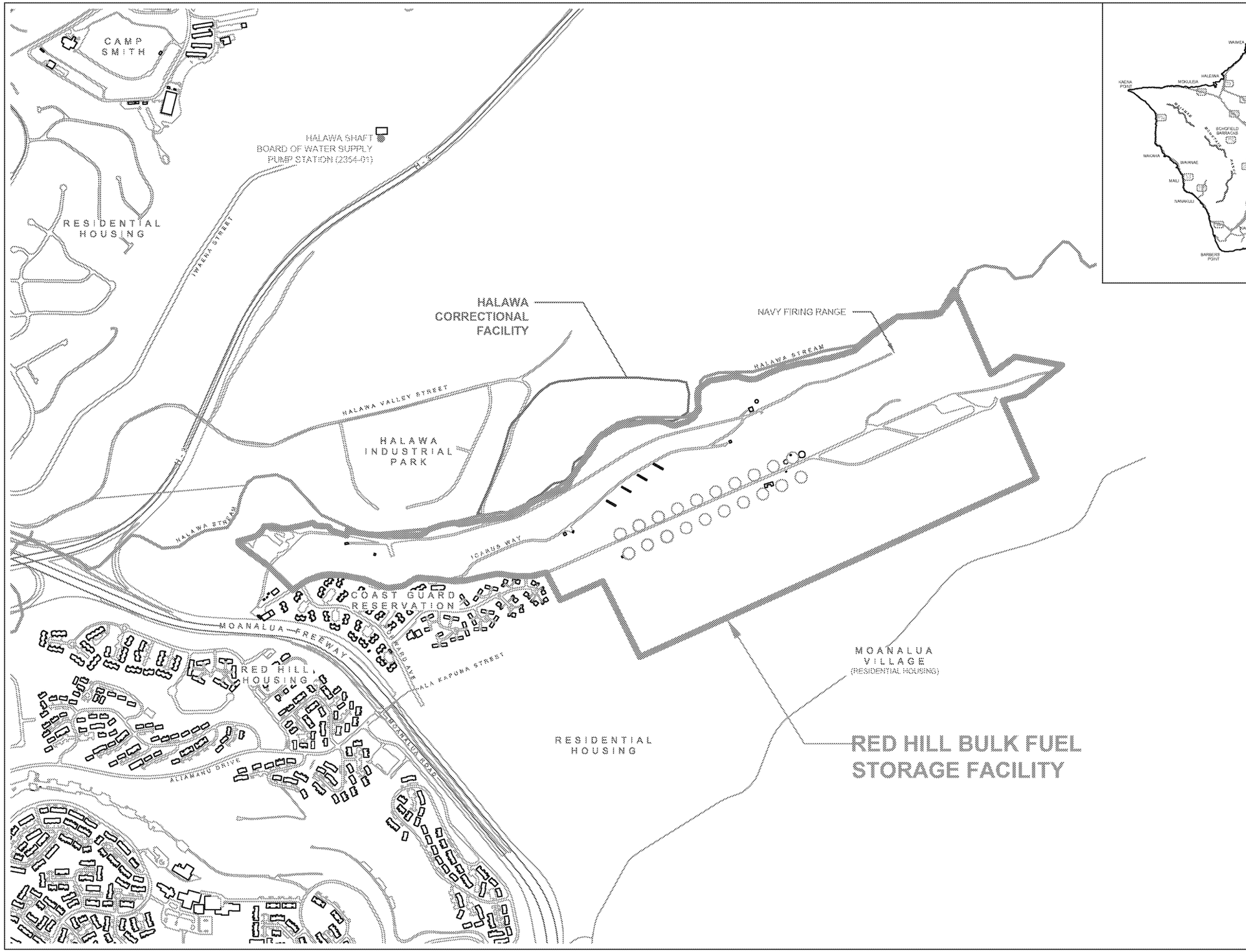

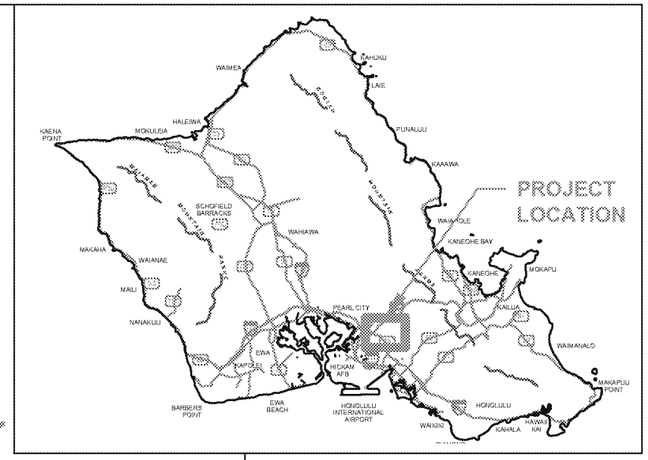

NOTES

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SOURCES

Pearl Harbor Base Map

Navy GIS files

NORTH

GRAPHIC SCALE

900 0 900

Scale in Feet

FIGURE 1

SITE LOCATION

GROUNDWATER MONITORING
RED HILL BULK FUEL STORAGE FACILITY
NAVAL SUPPLY SYSTEM COMMAND (NAVSUP)
FLEET LOGISTICS CENTER
JBPHH, OAHU, HAWAII

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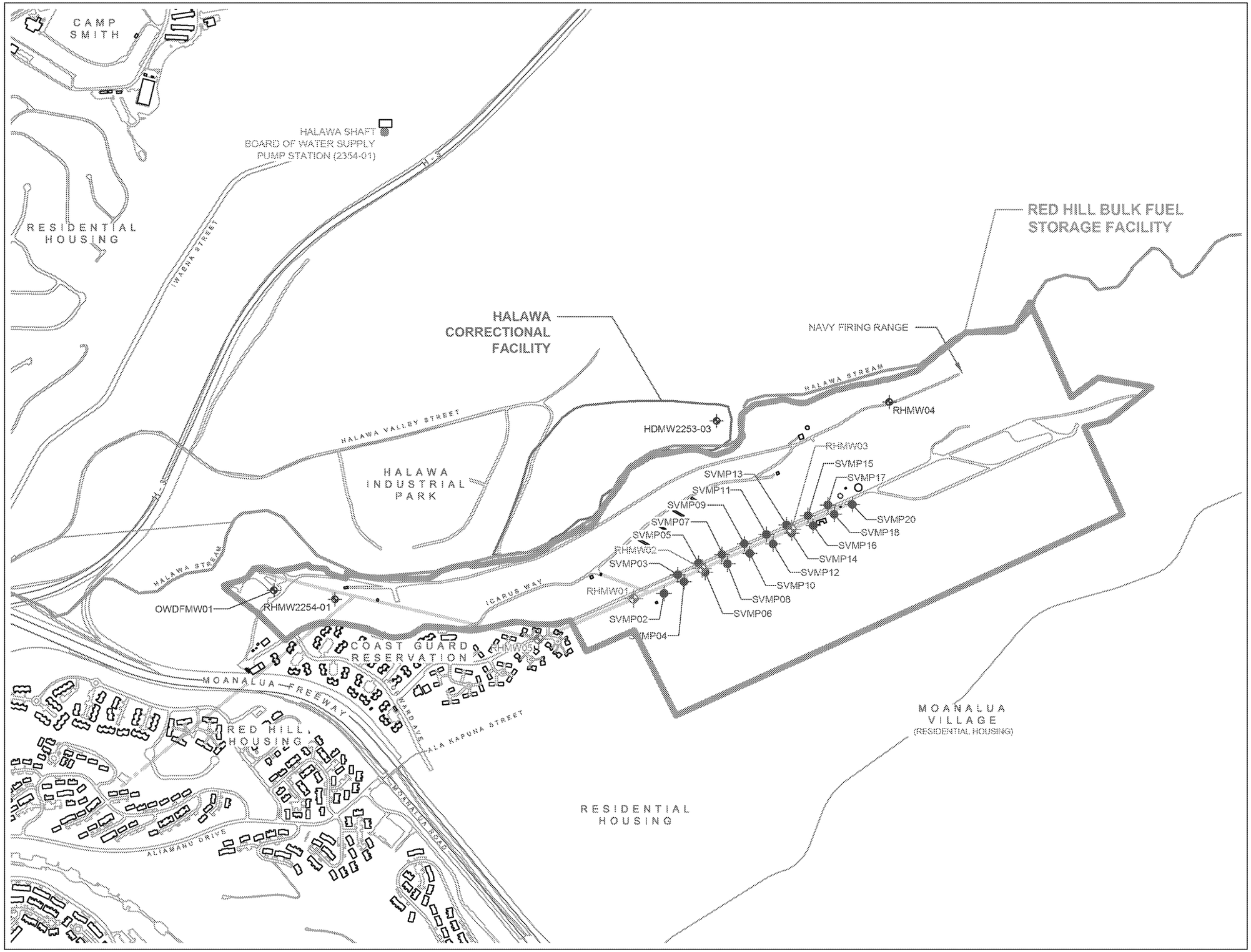

LEGEND

- RED HILL BULK FUEL STORAGE FACILITY
- HALAWA CORRECTIONAL FACILITY
- HALAWA STREAM
- BUILDING
- ROAD
- ABOVEGROUND STORAGE TANK
- WATER TANK
- SOIL VAPOR MONITORING POINT
- GROUNDWATER MONITORING WELL LOCATED INSIDE TUNNEL
- GROUNDWATER MONITORING WELL LOCATED OUTSIDE TUNNEL
- BOARD OF WATER SUPPLY PUMP STATION
- TUNNEL

NOTES

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SOURCES

Pearl Harbor Base Map

Navy GIS files

NORTH

GRAPHIC SCALE

800 0 800

Scale in Feet

FIGURE 2

SITE LAYOUT

GROUNDWATER MONITORING
RED HILL BULK FUEL STORAGE FACILITY
NAVAL SUPPLY SYSTEM COMMAND (NAVSUP)
FLEET LOGISTICS CENTER
JBPHH, OAHU, HAWAII

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APPENDIX A

Groundwater Sampling Logs

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Groundwater Sampling Log

Well ID: OWDFMW01 Location: Red Hill Bulk Fuel Storage Facility Project No.: 112066

Initial Water Level: 120.57 ft Date: 7/24/2014 Time: 825

Total Depth of Well: 144.74 ft Personnel Involved: Justin Lam, Jeff Hattemer

Length of Saturated Zone: - Weather Conditions: Overcast

Volume of Water to be Removed: 5.0 L Method of Removal: Disposable Hand Bailer

Water Level After Purging: 120.57 ft Pumping Rate: 0.42 L/min

Well Purge Data:

Time	Volume Removed	pH	Conductivity (mS/cm)	DO (mg/l)	Temperature	Salinity	Redox (ORP) (mV)
835	0.0 L	11.36	2.741	3.30	23.78	-	-94.2
837	1.0 L	11.40	2.857	2.20	23.76	-	-54.6
839	2.0 L	11.41	2.882	2.34	23.71	-	-25.7
841	3.0 L	11.43	2.874	2.25	23.67	-	-25.9
844	4.0 L	11.42	2.874	2.23	23.68	-	-23.8
847	5.0 L	11.42	2.88	2.30	23.64	-	-22.0

Sample Withdrawal Method: Disposable Hand Bailer

Appearance of Sample:

Color: Clear

Turbidity: Low

Sediment: White Particles

Other: None

Laboratory Analysis Parameters and Preservatives: TPH-d - 8015; TPH-g, VOCs - 8260; PAHs - 8270c sim; lead - 6020

Number and Types of Sample Containers: 16 - 40ml VOAs, 6 - 1L amber jar, 4 - 500ml amber jar, 4 - 500ml HDPE

Sample Identification Numbers: ES0109, ES0109 MS/MSD [0900]; ES110 [1000]

Decontamination Procedures: Triple Rinsed

Notes: YSI did not have salinity parameter

Sampled by: Justin Lam, Jeff Hattemer

Sampled Delivered to: Calscience Environmental Lab Transporters: FedEx

Date: 7/24/2014 Time: 1100

Capacity of Casing (Gallons/Linear Feet)

2"-0.16• 4"-0.65 • 8"-2.61 • 10"-4.08 • 12"-5.87

App A Out

Groundwater Sampling Log

Well ID: HDMW2253-03 Location: Red Hill Bulk Fuel Storage Facility Project No.: 112066

Initial Water Level: 208.08 ft Date: 7/23/2014 Time: 857

Total Depth of Well: 1575 ft Personnel Involved: Kirk Markle, Jeff Hattemer

Length of Saturated Zone: 1367 ft Weather Conditions: Sunny, Hot

Volume of Water to be Removed: 4.0 L Method of Removal: Disposable Hand Bailer

Water Level After Purging: 208.08 ft Pumping Rate: 0.31 L/min

Well Purge Data:

Time	Volume Removed	pH	Conductivity (mS/cm)	DO (mg/l)	Temperature	Salinity	Redox (ORP) (mV)
907	0.0 L	7.66	0.439	1.66	23.06	-	-95.3
934	1.0 L	7.41	0.413	5.01	22.96	-	-145.6
939	2.0 L	7.2	0.418	2.29	22.54	-	-118.6
942	2.5 L	7.15	0.413	2.89	22.56	-	-110.8
950	3.0 L	7.23	0.407	2.51	22.56	-	-115.9
955	4.0 L	7.06	0.422	2.55	22.47	-	-110.4

Sample Withdrawal Method: Disposable Hand Bailer

Appearance of Sample:

Color: Tan

Turbidity: Low

Sediment: Low - Small Black Particles

Other: None

Laboratory Analysis Parameters and Preservatives: TPH-d - 8015; TPH-g, VOCs - 8260; PAHs - 8270c sim; lead - 6020

Number and Types of Sample Containers: 6 - 40ml VOAs, 2 - 1L amber jar, 1 - 500ml amber jar, 1 - 250ml HDPE

Sample Identification Numbers: ES111 [1000]

Decontamination Procedures: Triple Rinsed

Notes: YSI did not have salinity parameter.

Sampled by: Kirk Markle, Jeff Hattemer

Sampled Delivered to: Calscience Environmental Lab Transporters: FedEx

Date: 7/23/2014 Time: 1500

Capacity of Casing (Gallons/Linear Feet)

2"-0.16• 4"-0.65 • 8"-2.61 • 10"-4.08 • 12"-5.87

App A Out

Groundwater Sampling Log

Well ID: RHMW04 Location: Red Hill Bulk Fuel Storage Facility Project No.: 114017

Initial Water Level: 294.33 ft Date: 7/23/2014 Time: 1353

Total Depth of Well: 305 ft Personnel Involved: Kirk Markle, Jeff Hattemer

Length of Saturated Zone: 11 ft Weather Conditions: Sunny, Hot

Volume of Water to be Removed: 7.0 L Method of Removal: Dedicated Bladder Pump

Water Level After Purging: 294.33 ft Pumping Rate: 0.39 L/min

Well Purge Data:

Time	Volume Removed	pH	Conductivity (mS/cm)	DO (mg/l)	Temperature	Salinity	Redox (ORP) (mV)
1330	0.0 L	8.41	0.400	8.87	23.66	-	126.7
1334	1.0 L	8.15	0.398	8.19	22.91	-	80.3
1337	2.0 L	7.87	0.399	7.85	22.54	-	52.7
1339	3.0 L	7.77	0.392	8.16	22.35	-	44.3
1341	4.0 L	7.65	0.399	7.93	22.27	-	39.3
1343	5.0 L	7.61	0.399	7.81	22.29	-	38.3
1345	6.0 L	7.58	0.391	8.10	22.36	-	39.4
1348	7.0 L	7.56	0.399	7.85	22.31	-	43.0

Sample Withdrawal Method: Dedicated Bladder Pump

Appearance of Sample:

Color: Clear

Turbidity: None

Sediment: None

Other: None

Laboratory Analysis Parameters and Preservatives: TPH-d - 8015; TPH-g, VOCs - 8260; PAHs - 8270c sim; lead - 6020

Number and Types of Sample Containers: 6 - 40ml VOAs, 2 - 1L amber jar, 1 - 500ml amber jar, 1 - 250ml HDPE

Sample Identification Numbers: ES112 [1355]

Decontamination Procedures: Triple Rinsed

Notes: YSI did not have salinity parameter.

Sampled by: Kirk Markle, Jeff Hattemer

Sampled Delivered to: Calscience Environmental Lab Transporters: FedEx

Date: 7/23/2014 Time: 1500

Capacity of Casing (Gallons/Linear Feet)

2"-0.16• 4"-0.65 • 8"-2.61 • 10"-4.08 • 12"-5.87

App A Out

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APPENDIX B

Field Notes

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Location RHSF Date 7/23/14

Project / Client NAVFAC

Purpose GW Sampling

Personnel JH, KM

0820 JH @ Halona prison

0825 DLNR onsite (Pat)

0835 KM onsite. Safety meeting. Enter prison.

0857 Gauge HDMW 2253-03

DTW = 208.08' btoc.

1000 4 gal purged, collected sample ES111.

1100 @ Red Hill Gate. Request access to RHMW04

Called 474-2222

1105 Cooked opens gate.

Set up @ RHMW04

Gauge RHMW04

1209 DTW = 294.31' btoc.

Setting up nitrogen tank and control box to sample w/ dedicated pump

65

Location RHSF Date 7/23/14

Project / Client NAVFAC

Time	Vol	pH	Conduct (mS/cm)	DO mg/L	Temp C	Redox
1330	0	8.41	0.400	8.87	23.66	126.7
1334	1	8.15	0.398	8.19	22.91	80.3
1337	2	7.87	0.399	7.85	22.54	52.7
1339	3	7.77	0.392	8.16	22.35	49.3
1341	4	7.65	0.399	7.93	22.27	39.3
1343	5	7.61	0.395	7.81	22.29	38.3
1345	6	7.58	0.391	8.10	22.36	39.4
1348	7	7.56	0.399	7.85	22.31	43.0

Water clear, no sheen, no odor.

1353 DTW = 294.33' btoc

1355 Collected sample ES112

1425 Depart Red Hill

1450 Lunch

1500 Go to Fuel Ex.

1525 Dropped off sample Head to Air Gas to return nitrogen cylinder

Location RHSF Date 7/24/14

Project / Client NAVFAC

Purpose: GW sampling
Personnel: JH, JL
Weather: partly cloudy
0710 @ office. Load ice.
0815 @ Red Hill, Safety mtg.
Gauge OWDFMW01 ~~308.08' btoc~~ 120.57' btoc
DTW = ~~308.08' btoc~~ 120.57' btoc
Begin purging OWDFMW01 w/ hand bailer.
Purged 5 liters.
0900 Collected sample ES109, ES109MS/MSD, and ES110 (duplicate listed @ 1000).
1010 Done packing samples. Dumped water in drum @ OWS ~1/3 full.
Go to get gas and to Fed Ex.
1045 Shipped samples Depart Fed Ex.

JH
7/24/14

Location Date

Project / Client

APPENDIX C

Laboratory Reports

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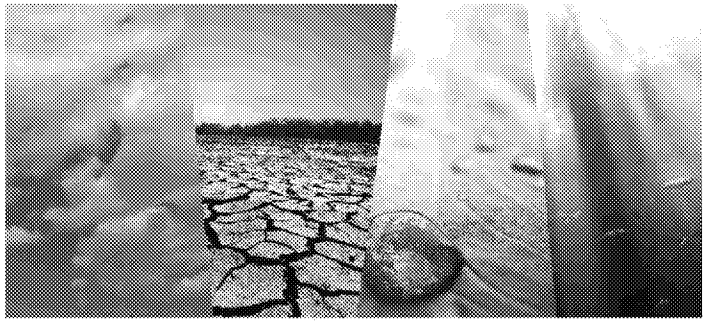
WORK ORDER NUMBER: 14-07-1643

The difference is service



AIR | SOIL | WATER | MARINE CHEMISTRY

Analytical Report For

Client: Environmental Science International, Inc.

Client Project Name: Red Hill LTM 112066

Attention: Robert Chong
354 Uluniu Street, Suite 304
Kailua, HI 96734-2500

Approved for release on 07/31/2014 by:
Richard Villafania
Project Manager

ResultLink ▸

Email your PM ▸

nelac

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Work Order Number: 14-07-1643

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Work Order Narrative

Work Order: 14-07-1643 Page 1 of 1

Condition Upon Receipt:

Samples were received under Chain-of-Custody (COC) on 07/24/14. They were assigned to Work Order 14-07-1643.

Unless otherwise noted on the Sample Receiving forms all samples were received in good condition and within the recommended EPA temperature criteria for the methods noted on the COC. The COC and Sample Receiving Documents are integral elements of the analytical report and are presented at the back of the report.

Holding Times:

All samples were analyzed within prescribed holding times (HT) and/or in accordance with the Calscience Sample Acceptance Policy unless otherwise noted in the analytical report and/or comprehensive case narrative, if required.

Any parameter identified in 40CFR Part 136.3 Table II that is designated as "analyze immediately" with a holding time of <= 15 minutes (40CFR-136.3 Table II, footnote 4), is considered a "field" test and the reported results will be qualified as being received outside of the stated holding time unless received at the laboratory within 15 minutes of the collection time.

Quality Control:

All quality control parameters (QC) were within established control limits except where noted in the QC summary forms or described further within this report.

Additional Comments:

Air - Sorbent-extracted air methods (EPA TO-4A, EPA TO-10, EPA TO-13A, EPA TO-17): Analytical results are converted from mass/sample basis to mass/volume basis using client-supplied air volumes.

New York NELAP air certification does not certify for all reported methods and analytes, reference the accredited items here: http://www.calscience.com/PDF/New_York.pdf

Solid - Unless otherwise indicated, solid sample data is reported on a wet weight basis, not corrected for % moisture. All QC results are always reported on a wet weight basis.

Subcontractor Information:

Unless otherwise noted below (or on the subcontract form), no samples were subcontracted.

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Analytical Report

Environmental Science International, Inc.		Date Received:	07/24/14
354 Uluniu Street, Suite 304		Work Order:	14-07-1643
Kailua, HI 96734-2500		Preparation:	EPA 3510C
		Method:	EPA 8015B (M)
		Units:	ug/L
Project: Red Hill LTM 112066			Page 1 of 1

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
ES111	**14-07-1643-1-H**	**07/23/14 10:00**	**Aqueous**	**GC 46**	**07/25/14**	**07/26/14 11:30**	**140725B12**

Comment(s): - Results were evaluated to the MDL (DL), concentrations >= to the MDL (DL) but < RL (LOQ), if found, are qualified with a "J" flag.

Parameter	Result	DL	LOD	LOQ	DF	Qualifiers
TPH as Diesel	<12	11	12	25	1.00	U

Surrogate	Rec. (%)	Control Limits	Qualifiers
n-Octacosane	75	51-141	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
ES112	**14-07-1643-2-H**	**07/23/14 13:55**	**Aqueous**	**GC 46**	**07/25/14**	**07/26/14 11:47**	**140725B12**

Comment(s): - Results were evaluated to the MDL (DL), concentrations >= to the MDL (DL) but < RL (LOQ), if found, are qualified with a "J" flag.

Parameter	Result	DL	LOD	LOQ	DF	Qualifiers
TPH as Diesel	17	11	12	25	1.00	HD,J

Surrogate	Rec. (%)	Control Limits	Qualifiers
n-Octacosane	75	51-141	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
Method Blank	**099-15-516-160**	**N/A**	**Aqueous**	**GC 46**	**07/25/14**	**07/26/14 08:00**	**140725B12**

Comment(s): - Results were evaluated to the MDL (DL), concentrations >= to the MDL (DL) but < RL (LOQ), if found, are qualified with a "J" flag.

Parameter	Result	DL	LOD	LOQ	DF	Qualifiers
TPH as Diesel	<25	23	25	50	1.00	U

Surrogate	Rec. (%)	Control Limits	Qualifiers
n-Octacosane	70	51-141	

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Analytical Report

Environmental Science International, Inc.		Date Received:	07/24/14
354 Uluniu Street, Suite 304		Work Order:	14-07-1643
Kailua, HI 96734-2500		Preparation:	EPA 3005A Filt.
		Method:	EPA 6020
		Units:	ug/L
Project: Red Hill LTM 112066			Page 1 of 1

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
ES111	**14-07-1643-1-G**	**07/23/14 10:00**	**Aqueous**	**ICP/MS 03**	**07/25/14**	**07/28/14 16:26**	**140725L05D**

Comment(s): - Results were evaluated to the MDL (DL), concentrations >= to the MDL (DL) but < RL (LOQ), if found, are qualified with a "J" flag.

Parameter	Result	DL	LOD	LOQ	DF	Qualifiers
Lead	<0.200	0.0898	0.200	1.00	1.00	U

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
ES112	**14-07-1643-2-G**	**07/23/14 13:55**	**Aqueous**	**ICP/MS 03**	**07/25/14**	**07/28/14 16:28**	**140725L05D**

Comment(s): - Results were evaluated to the MDL (DL), concentrations >= to the MDL (DL) but < RL (LOQ), if found, are qualified with a "J" flag.

Parameter	Result	DL	LOD	LOQ	DF	Qualifiers
Lead	<0.200	0.0898	0.200	1.00	1.00	U

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
Method Blank	**099-14-497-88**	**N/A**	**Aqueous**	**ICP/MS 03**	**07/25/14**	**07/28/14 15:57**	**140725L05D**

Comment(s): - Results were evaluated to the MDL (DL), concentrations >= to the MDL (DL) but < RL (LOQ), if found, are qualified with a "J" flag.

Parameter	Result	DL	LOD	LOQ	DF	Qualifiers
Lead	<0.200	0.0898	0.200	1.00	1.00	U

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Analytical Report

Environmental Science International, Inc.		Date Received:	07/24/14
354 Uluniu Street, Suite 304		Work Order:	14-07-1643
Kailua, HI 96734-2500		Preparation:	EPA 3510C
		Method:	EPA 8270C SIM PAHs
		Units:	ug/L
Project: Red Hill LTM 112066			Page 1 of 3

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
ES111	**14-07-1643-1-J**	**07/23/14 10:00**	**Aqueous**	**GC/MS AAA**	**07/28/14**	**07/29/14 18:42**	**140728L01**

Comment(s): - Results were evaluated to the MDL (DL), concentrations >= to the MDL (DL) but < RL (LOQ), if found, are qualified with a "J" flag.

Parameter	Result	DL	LOD	LOQ	DF	Qualifiers
Naphthalene	<0.053	0.024	0.053	0.21	1.00	U
2-Methylnaphthalene	<0.053	0.028	0.053	0.21	1.00	U
1-Methylnaphthalene	<0.053	0.030	0.053	0.21	1.00	U
Acenaphthylene	<0.053	0.019	0.053	0.21	1.00	U
Acenaphthene	<0.053	0.022	0.053	0.21	1.00	U
Fluorene	<0.053	0.026	0.053	0.21	1.00	U
Phenanthrene	<0.053	0.032	0.053	0.21	1.00	U
Anthracene	<0.053	0.036	0.053	0.21	1.00	U
Fluoranthene	<0.053	0.029	0.053	0.21	1.00	U
Pyrene	<0.053	0.026	0.053	0.21	1.00	U
Benzo (a) Anthracene	<0.053	0.025	0.053	0.21	1.00	U
Chrysene	<0.053	0.020	0.053	0.21	1.00	U
Benzo (k) Fluoranthene	<0.053	0.025	0.053	0.21	1.00	U
Benzo (b) Fluoranthene	<0.053	0.026	0.053	0.21	1.00	U
Benzo (a) Pyrene	<0.053	0.038	0.053	0.21	1.00	U
Indeno (1,2,3-c,d) Pyrene	<0.053	0.023	0.053	0.21	1.00	U
Dibenz (a,h) Anthracene	<0.053	0.028	0.053	0.21	1.00	U
Benzo (g,h,i) Perylene	<0.053	0.023	0.053	0.21	1.00	U

Surrogate	Rec. (%)	Control Limits	Qualifiers
Nitrobenzene-d5	67	28-139	
2-Fluorobiphenyl	73	33-144	
p-Terphenyl-d14	63	23-160	

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Analytical Report

Environmental Science International, Inc.		Date Received:	07/24/14
354 Uluniu Street, Suite 304		Work Order:	14-07-1643
Kailua, HI 96734-2500		Preparation:	EPA 3510C
		Method:	EPA 8270C SIM PAHs
		Units:	ug/L
Project: Red Hill LTM 112066			Page 2 of 3

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
ES112	**14-07-1643-2-J**	**07/23/14 13:55**	**Aqueous**	**GC/MS AAA**	**07/28/14**	**07/29/14 19:06**	**140728L01**

Comment(s): - Results were evaluated to the MDL (DL), concentrations >= to the MDL (DL) but < RL (LOQ), if found, are qualified with a "J" flag.

Parameter	Result	DL	LOD	LOQ	DF	Qualifiers
Naphthalene	<0.052	0.024	0.052	0.21	1.00	U
2-Methylnaphthalene	<0.052	0.028	0.052	0.21	1.00	U
1-Methylnaphthalene	<0.052	0.030	0.052	0.21	1.00	U
Acenaphthylene	<0.052	0.019	0.052	0.21	1.00	U
Acenaphthene	<0.052	0.022	0.052	0.21	1.00	U
Fluorene	<0.052	0.026	0.052	0.21	1.00	U
Phenanthrene	<0.052	0.032	0.052	0.21	1.00	U
Anthracene	<0.052	0.036	0.052	0.21	1.00	U
Fluoranthene	<0.052	0.028	0.052	0.21	1.00	U
Pyrene	<0.052	0.026	0.052	0.21	1.00	U
Benzo (a) Anthracene	<0.052	0.025	0.052	0.21	1.00	U
Chrysene	<0.052	0.020	0.052	0.21	1.00	U
Benzo (k) Fluoranthene	<0.052	0.024	0.052	0.21	1.00	U
Benzo (b) Fluoranthene	<0.052	0.026	0.052	0.21	1.00	U
Benzo (a) Pyrene	<0.052	0.038	0.052	0.21	1.00	U
Indeno (1,2,3-c,d) Pyrene	<0.052	0.023	0.052	0.21	1.00	U
Dibenz (a,h) Anthracene	<0.052	0.028	0.052	0.21	1.00	U
Benzo (g,h,i) Perylene	<0.052	0.023	0.052	0.21	1.00	U

Surrogate	Rec. (%)	Control Limits	Qualifiers
Nitrobenzene-d5	62	28-139	
2-Fluorobiphenyl	67	33-144	
p-Terphenyl-d14	59	23-160	

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Analytical Report

Environmental Science International, Inc.		Date Received:	07/24/14
354 Uluniu Street, Suite 304		Work Order:	14-07-1643
Kailua, HI 96734-2500		Preparation:	EPA 3510C
		Method:	EPA 8270C SIM PAHs
		Units:	ug/L
Project: Red Hill LTM 112066			Page 3 of 3

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
Method Blank	**099-15-148-52**	**N/A**	**Aqueous**	**GC/MS AAA**	**07/28/14**	**07/29/14 13:03**	**140728L01**

Comment(s): - Results were evaluated to the MDL (DL), concentrations >= to the MDL (DL) but < RL (LOQ), if found, are qualified with a "J" flag.

Parameter	Result	DL	LOD	LOQ	DF	Qualifiers
Naphthalene	<0.050	0.023	0.050	0.20	1.00	U
2-Methylnaphthalene	<0.050	0.026	0.050	0.20	1.00	U
1-Methylnaphthalene	<0.050	0.028	0.050	0.20	1.00	U
Acenaphthylene	<0.050	0.018	0.050	0.20	1.00	U
Acenaphthene	<0.050	0.021	0.050	0.20	1.00	U
Fluorene	<0.050	0.024	0.050	0.20	1.00	U
Phenanthrene	<0.050	0.031	0.050	0.20	1.00	U
Anthracene	<0.050	0.034	0.050	0.20	1.00	U
Fluoranthene	<0.050	0.027	0.050	0.20	1.00	U
Pyrene	<0.050	0.025	0.050	0.20	1.00	U
Benzo (a) Anthracene	<0.050	0.024	0.050	0.20	1.00	U
Chrysene	<0.050	0.019	0.050	0.20	1.00	U
Benzo (k) Fluoranthene	<0.050	0.023	0.050	0.20	1.00	U
Benzo (b) Fluoranthene	<0.050	0.025	0.050	0.20	1.00	U
Benzo (a) Pyrene	<0.050	0.036	0.050	0.20	1.00	U
Indeno (1,2,3-c,d) Pyrene	<0.050	0.022	0.050	0.20	1.00	U
Dibenz (a,h) Anthracene	<0.050	0.027	0.050	0.20	1.00	U
Benzo (g,h,i) Perylene	<0.050	0.022	0.050	0.20	1.00	U

Surrogate	Rec. (%)	Control Limits	Qualifiers
Nitrobenzene-d5	90	28-139	
2-Fluorobiphenyl	86	33-144	
p-Terphenyl-d14	87	23-160	

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Analytical Report

Environmental Science International, Inc.		Date Received:	07/24/14
354 Uluniu Street, Suite 304		Work Order:	14-07-1643
Kailua, HI 96734-2500		Preparation:	EPA 5030C
		Method:	GC/MS / EPA 8260B
		Units:	ug/L
Project: Red Hill LTM 112066			Page 1 of 8

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
ES111	**14-07-1643-1-A**	**07/23/14 10:00**	**Aqueous**	**GC/MS OO**	**07/24/14**	**07/24/14 21:33**	**140724L018**

Comment(s): - Results were evaluated to the MDL (DL), concentrations >= to the MDL (DL) but < RL (LOQ), if found, are qualified with a "J" flag.

Parameter	Result	DL	LOD	LOQ	DF	Qualifiers
Acetone	<10	6.0	10	20	1.00	U,IH,ICH
Benzene	<0.50	0.14	0.50	1.0	1.00	U
Bromodichloromethane	<0.50	0.21	0.50	5.0	1.00	U
Bromoform	<1.0	0.50	1.0	10	1.00	U
Bromomethane	<5.0	3.9	5.0	20	1.00	U
2-Butanone	<5.0	2.2	5.0	10	1.00	U
Carbon Tetrachloride	<0.50	0.23	0.50	1.0	1.00	U
Chlorobenzene	<0.50	0.17	0.50	5.0	1.00	U
Chloroethane	<5.0	2.3	5.0	10	1.00	U
Chloroform	<0.50	0.46	0.50	5.0	1.00	U
Chloromethane	<2.0	1.8	2.0	10	1.00	U
Dibromochloromethane	<0.50	0.25	0.50	1.0	1.00	U
1,2-Dibromo-3-Chloropropane	<2.0	1.2	2.0	10	1.00	U
1,2-Dibromoethane	<0.50	0.36	0.50	1.0	1.00	U
1,2-Dichlorobenzene	<0.50	0.46	0.50	1.0	1.00	U
1,3-Dichlorobenzene	<0.50	0.40	0.50	1.0	1.00	U
1,4-Dichlorobenzene	<0.50	0.43	0.50	1.0	1.00	U
1,1-Dichloroethane	<0.50	0.28	0.50	5.0	1.00	U
1,2-Dichloroethane	<0.50	0.24	0.50	1.0	1.00	U
1,1-Dichloroethene	<0.50	0.43	0.50	1.0	1.00	U
c-1,2-Dichloroethene	<0.50	0.48	0.50	1.0	1.00	U
t-1,2-Dichloroethene	<0.50	0.37	0.50	1.0	1.00	U
1,2-Dichloropropane	<0.50	0.42	0.50	5.0	1.00	U
c-1,3-Dichloropropene	<0.50	0.25	0.50	1.0	1.00	U
t-1,3-Dichloropropene	<0.50	0.25	0.50	1.0	1.00	U
Ethylbenzene	<0.50	0.14	0.50	1.0	1.00	U
Methylene Chloride	<1.0	0.64	1.0	5.0	1.00	U
4-Methyl-2-Pentanone	<5.0	4.4	5.0	10	1.00	U
Styrene	<0.50	0.17	0.50	1.0	1.00	U
1,1,1,2-Tetrachloroethane	<0.50	0.40	0.50	1.0	1.00	U
1,1,2,2-Tetrachloroethane	<0.50	0.41	0.50	1.0	1.00	U
Tetrachloroethene	<0.50	0.39	0.50	5.0	1.00	U
Toluene	<0.50	0.24	0.50	1.0	1.00	U
1,2,4-Trichlorobenzene	<1.0	0.50	1.0	5.0	1.00	U
1,1,1-Trichloroethane	<0.50	0.30	0.50	5.0	1.00	U
Hexachloro-1,3-Butadiene	<0.50	0.32	0.50	1.0	1.00	U

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Analytical Report

Environmental Science International, Inc.	Date Received:	07/24/14
354 Uluniu Street, Suite 304	Work Order:	14-07-1643
Kailua, HI 96734-2500	Preparation:	EPA 5030C
	Method:	GC/MS / EPA 8260B
	Units:	ug/L
Project: Red Hill LTM 112066		Page 2 of 8

Parameter	Result	DL	LOD	LOQ	DF	Qualifiers
1,1,2-Trichloroethane	<0.50	0.38	0.50	1.0	1.00	U
Trichloroethene	<0.50	0.37	0.50	1.0	1.00	U
1,2,3-Trichloropropane	<1.0	0.64	1.0	5.0	1.00	U
Vinyl Chloride	<0.50	0.30	0.50	1.0	1.00	U
p/m-Xylene	<1.0	0.30	1.0	10	1.00	U
o-Xylene	<0.50	0.23	0.50	1.0	1.00	U
Methyl-t-Butyl Ether (MTBE)	<0.50	0.31	0.50	1.0	1.00	U
Gasoline Range Organics	<30	26	30	50	1.00	U

Surrogate	Rec. (%)	Control Limits	Qualifiers
Dibromofluoromethane	100	80-126	
1,2-Dichloroethane-d4	98	80-134	
Toluene-d8	100	80-120	
Toluene-d8-TPPH	100	88-112	
1,4-Bromofluorobenzene	94	80-120	

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Analytical Report

Environmental Science International, Inc.		Date Received:	07/24/14
354 Uluniu Street, Suite 304		Work Order:	14-07-1643
Kailua, HI 96734-2500		Preparation:	EPA 5030C
		Method:	GC/MS / EPA 8260B
		Units:	ug/L
Project: Red Hill LTM 112066			Page 3 of 8

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
ES112	**14-07-1643-2-A**	**07/23/14 13:55**	**Aqueous**	**GC/MS OO**	**07/24/14**	**07/24/14 22:00**	**140724L018**

Comment(s): - Results were evaluated to the MDL (DL), concentrations >= to the MDL (DL) but < RL (LOQ), if found, are qualified with a "J" flag.

Parameter	Result	DL	LOD	LOQ	DF	Qualifiers
Acetone	<10	6.0	10	20	1.00	U,IH,ICH
Benzene	<0.50	0.14	0.50	1.0	1.00	U
Bromodichloromethane	<0.50	0.21	0.50	5.0	1.00	U
Bromoform	<1.0	0.50	1.0	10	1.00	U
Bromomethane	<5.0	3.9	5.0	20	1.00	U
2-Butanone	<5.0	2.2	5.0	10	1.00	U
Carbon Tetrachloride	<0.50	0.23	0.50	1.0	1.00	U
Chlorobenzene	<0.50	0.17	0.50	5.0	1.00	U
Chloroethane	<5.0	2.3	5.0	10	1.00	U
Chloroform	<0.50	0.46	0.50	5.0	1.00	U
Chloromethane	<2.0	1.8	2.0	10	1.00	U
Dibromochloromethane	<0.50	0.25	0.50	1.0	1.00	U
1,2-Dibromo-3-Chloropropane	<2.0	1.2	2.0	10	1.00	U
1,2-Dibromoethane	<0.50	0.36	0.50	1.0	1.00	U
1,2-Dichlorobenzene	<0.50	0.46	0.50	1.0	1.00	U
1,3-Dichlorobenzene	<0.50	0.40	0.50	1.0	1.00	U
1,4-Dichlorobenzene	<0.50	0.43	0.50	1.0	1.00	U
1,1-Dichloroethane	<0.50	0.28	0.50	5.0	1.00	U
1,2-Dichloroethane	<0.50	0.24	0.50	1.0	1.00	U
1,1-Dichloroethene	<0.50	0.43	0.50	1.0	1.00	U
c-1,2-Dichloroethene	<0.50	0.48	0.50	1.0	1.00	U
t-1,2-Dichloroethene	<0.50	0.37	0.50	1.0	1.00	U
1,2-Dichloropropane	<0.50	0.42	0.50	5.0	1.00	U
c-1,3-Dichloropropene	<0.50	0.25	0.50	1.0	1.00	U
t-1,3-Dichloropropene	<0.50	0.25	0.50	1.0	1.00	U
Ethylbenzene	<0.50	0.14	0.50	1.0	1.00	U
Methylene Chloride	<1.0	0.64	1.0	5.0	1.00	U
4-Methyl-2-Pentanone	<5.0	4.4	5.0	10	1.00	U
Styrene	<0.50	0.17	0.50	1.0	1.00	U
1,1,1,2-Tetrachloroethane	<0.50	0.40	0.50	1.0	1.00	U
1,1,2,2-Tetrachloroethane	<0.50	0.41	0.50	1.0	1.00	U
Tetrachloroethene	<0.50	0.39	0.50	5.0	1.00	U
Toluene	<0.50	0.24	0.50	1.0	1.00	U
1,2,4-Trichlorobenzene	<1.0	0.50	1.0	5.0	1.00	U
1,1,1-Trichloroethane	<0.50	0.30	0.50	5.0	1.00	U
Hexachloro-1,3-Butadiene	<0.50	0.32	0.50	1.0	1.00	U

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Analytical Report

Environmental Science International, Inc.
354 Uluniu Street, Suite 304
Kailua, HI 96734-2500

Date Received: 07/24/14
Work Order: 14-07-1643
Preparation: EPA 5030C
Method: GC/MS / EPA 8260B
Units: ug/L

Project: Red Hill LTM 112066

Parameter	Result	DL	LOD	LOQ	DF	Qualifiers
1,1,2-Trichloroethane	<0.50	0.38	0.50	1.0	1.00	U
Trichloroethene	<0.50	0.37	0.50	1.0	1.00	U
1,2,3-Trichloropropane	<1.0	0.64	1.0	5.0	1.00	U
Vinyl Chloride	<0.50	0.30	0.50	1.0	1.00	U
p/m-Xylene	<1.0	0.30	1.0	10	1.00	U
o-Xylene	<0.50	0.23	0.50	1.0	1.00	U
Methyl-t-Butyl Ether (MTBE)	<0.50	0.31	0.50	1.0	1.00	U
Gasoline Range Organics	<30	26	30	50	1.00	U

Surrogate	Rec. (%)	Control Limits	Qualifiers
Dibromofluoromethane	99	80-126	
1,2-Dichloroethane-d4	97	80-134	
Toluene-d8	100	80-120	
Toluene-d8-TPPH	100	88-112	
1,4-Bromofluorobenzene	93	80-120	

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Analytical Report

Environmental Science International, Inc.		Date Received:	07/24/14
354 Uluniu Street, Suite 304		Work Order:	14-07-1643
Kailua, HI 96734-2500		Preparation:	EPA 5030C
		Method:	GC/MS / EPA 8260B
		Units:	ug/L
Project: Red Hill LTM 112066			Page 5 of 8

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
ES TRIP	**14-07-1643-3-A**	**07/23/14 08:00**	**Aqueous**	**GC/MS OO**	**07/24/14**	**07/24/14 21:06**	**140724L018**

Comment(s): - Results were evaluated to the MDL (DL), concentrations >= to the MDL (DL) but < RL (LOQ), if found, are qualified with a "J" flag.

Parameter	Result	DL	LOD	LOQ	DF	Qualifiers
Acetone	<10	6.0	10	20	1.00	U,IH,ICH
Benzene	<0.50	0.14	0.50	1.0	1.00	U
Bromodichloromethane	<0.50	0.21	0.50	5.0	1.00	U
Bromoform	<1.0	0.50	1.0	10	1.00	U
Bromomethane	<5.0	3.9	5.0	20	1.00	U
2-Butanone	<5.0	2.2	5.0	10	1.00	U
Carbon Tetrachloride	<0.50	0.23	0.50	1.0	1.00	U
Chlorobenzene	<0.50	0.17	0.50	5.0	1.00	U
Chloroethane	<5.0	2.3	5.0	10	1.00	U
Chloroform	<0.50	0.46	0.50	5.0	1.00	U
Chloromethane	<2.0	1.8	2.0	10	1.00	U
Dibromochloromethane	<0.50	0.25	0.50	1.0	1.00	U
1,2-Dibromo-3-Chloropropane	<2.0	1.2	2.0	10	1.00	U
1,2-Dibromoethane	<0.50	0.36	0.50	1.0	1.00	U
1,2-Dichlorobenzene	<0.50	0.46	0.50	1.0	1.00	U
1,3-Dichlorobenzene	<0.50	0.40	0.50	1.0	1.00	U
1,4-Dichlorobenzene	<0.50	0.43	0.50	1.0	1.00	U
1,1-Dichloroethane	<0.50	0.28	0.50	5.0	1.00	U
1,2-Dichloroethane	<0.50	0.24	0.50	1.0	1.00	U
1,1-Dichloroethene	<0.50	0.43	0.50	1.0	1.00	U
c-1,2-Dichloroethene	<0.50	0.48	0.50	1.0	1.00	U
t-1,2-Dichloroethene	<0.50	0.37	0.50	1.0	1.00	U
1,2-Dichloropropane	<0.50	0.42	0.50	5.0	1.00	U
c-1,3-Dichloropropene	<0.50	0.25	0.50	1.0	1.00	U
t-1,3-Dichloropropene	<0.50	0.25	0.50	1.0	1.00	U
Ethylbenzene	<0.50	0.14	0.50	1.0	1.00	U
Methylene Chloride	0.71	0.64	1.0	5.0	1.00	J
4-Methyl-2-Pentanone	<5.0	4.4	5.0	10	1.00	U
Styrene	<0.50	0.17	0.50	1.0	1.00	U
1,1,1,2-Tetrachloroethane	<0.50	0.40	0.50	1.0	1.00	U
1,1,2,2-Tetrachloroethane	<0.50	0.41	0.50	1.0	1.00	U
Tetrachloroethene	<0.50	0.39	0.50	5.0	1.00	U
Toluene	<0.50	0.24	0.50	1.0	1.00	U
1,2,4-Trichlorobenzene	<1.0	0.50	1.0	5.0	1.00	U
1,1,1-Trichloroethane	<0.50	0.30	0.50	5.0	1.00	U
Hexachloro-1,3-Butadiene	<0.50	0.32	0.50	1.0	1.00	U

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Analytical Report

Environmental Science International, Inc.
354 Uluniu Street, Suite 304
Kailua, HI 96734-2500

Date Received: 07/24/14
Work Order: 14-07-1643
Preparation: EPA 5030C
Method: GC/MS / EPA 8260B
Units: ug/L

Project: Red Hill LTM 112066

Parameter	Result	DL	LOD	LOQ	DF	Qualifiers
1,1,2-Trichloroethane	<0.50	0.38	0.50	1.0	1.00	U
Trichloroethene	<0.50	0.37	0.50	1.0	1.00	U
1,2,3-Trichloropropane	<1.0	0.64	1.0	5.0	1.00	U
Vinyl Chloride	<0.50	0.30	0.50	1.0	1.00	U
p/m-Xylene	<1.0	0.30	1.0	10	1.00	U
o-Xylene	<0.50	0.23	0.50	1.0	1.00	U
Methyl-t-Butyl Ether (MTBE)	<0.50	0.31	0.50	1.0	1.00	U
Gasoline Range Organics	<30	26	30	50	1.00	U

Surrogate	Rec. (%)	Control Limits	Qualifiers
Dibromofluoromethane	101	80-126	
1,2-Dichloroethane-d4	98	80-134	
Toluene-d8	100	80-120	
Toluene-d8-TPPH	99	88-112	
1,4-Bromofluorobenzene	94	80-120	

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Analytical Report

Environmental Science International, Inc.		Date Received:	07/24/14
354 Uluniu Street, Suite 304		Work Order:	14-07-1643
Kailua, HI 96734-2500		Preparation:	EPA 5030C
		Method:	GC/MS / EPA 8260B
		Units:	ug/L
Project: Red Hill LTM 112066			Page 7 of 8

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
Method Blank	**099-13-057-59**	**N/A**	**Aqueous**	**GC/MS OO**	**07/24/14**	**07/24/14 17:21**	**140724L018**

Comment(s): - Results were evaluated to the MDL (DL), concentrations >= to the MDL (DL) but < RL (LOQ), if found, are qualified with a "J" flag.

Parameter	Result	DL	LOD	LOQ	DF	Qualifiers
Acetone	<10	6.0	10	20	1.00	U
Benzene	<0.50	0.14	0.50	1.0	1.00	U
Bromodichloromethane	<0.50	0.21	0.50	5.0	1.00	U
Bromoform	<1.0	0.50	1.0	10	1.00	U
Bromomethane	<5.0	3.9	5.0	20	1.00	U
2-Butanone	<5.0	2.2	5.0	10	1.00	U
Carbon Tetrachloride	<0.50	0.23	0.50	1.0	1.00	U
Chlorobenzene	<0.50	0.17	0.50	5.0	1.00	U
Chloroethane	<5.0	2.3	5.0	10	1.00	U
Chloroform	<0.50	0.46	0.50	5.0	1.00	U
Chloromethane	<2.0	1.8	2.0	10	1.00	U
Dibromochloromethane	<0.50	0.25	0.50	1.0	1.00	U
1,2-Dibromo-3-Chloropropane	<2.0	1.2	2.0	10	1.00	U
1,2-Dibromoethane	<0.50	0.36	0.50	1.0	1.00	U
1,2-Dichlorobenzene	<0.50	0.46	0.50	1.0	1.00	U
1,3-Dichlorobenzene	<0.50	0.40	0.50	1.0	1.00	U
1,4-Dichlorobenzene	<0.50	0.43	0.50	1.0	1.00	U
1,1-Dichloroethane	<0.50	0.28	0.50	5.0	1.00	U
1,2-Dichloroethane	<0.50	0.24	0.50	1.0	1.00	U
1,1-Dichloroethene	<0.50	0.43	0.50	1.0	1.00	U
c-1,2-Dichloroethene	<0.50	0.48	0.50	1.0	1.00	U
t-1,2-Dichloroethene	<0.50	0.37	0.50	1.0	1.00	U
1,2-Dichloropropane	<0.50	0.42	0.50	5.0	1.00	U
c-1,3-Dichloropropene	<0.50	0.25	0.50	1.0	1.00	U
t-1,3-Dichloropropene	<0.50	0.25	0.50	1.0	1.00	U
Ethylbenzene	<0.50	0.14	0.50	1.0	1.00	U
Methylene Chloride	<1.0	0.64	1.0	5.0	1.00	U
4-Methyl-2-Pentanone	<5.0	4.4	5.0	10	1.00	U
Styrene	<0.50	0.17	0.50	1.0	1.00	U
1,1,1,2-Tetrachloroethane	<0.50	0.40	0.50	1.0	1.00	U
1,1,2,2-Tetrachloroethane	<0.50	0.41	0.50	1.0	1.00	U
Tetrachloroethene	<0.50	0.39	0.50	5.0	1.00	U
Toluene	<0.50	0.24	0.50	1.0	1.00	U
1,2,4-Trichlorobenzene	<1.0	0.50	1.0	5.0	1.00	U
1,1,1-Trichloroethane	<0.50	0.30	0.50	5.0	1.00	U
Hexachloro-1,3-Butadiene	<0.50	0.32	0.50	1.0	1.00	U

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Analytical Report

Environmental Science International, Inc.
354 Uluniu Street, Suite 304
Kailua, HI 96734-2500

Date Received: 07/24/14
Work Order: 14-07-1643
Preparation: EPA 5030C
Method: GC/MS / EPA 8260B
Units: ug/L

Project: Red Hill LTM 112066

Parameter	Result	DL	LOD	LOQ	DF	Qualifiers
1,1,2-Trichloroethane	<0.50	0.38	0.50	1.0	1.00	U
Trichloroethene	<0.50	0.37	0.50	1.0	1.00	U
1,2,3-Trichloropropane	<1.0	0.64	1.0	5.0	1.00	U
Vinyl Chloride	<0.50	0.30	0.50	1.0	1.00	U
p/m-Xylene	<1.0	0.30	1.0	10	1.00	U
o-Xylene	<0.50	0.23	0.50	1.0	1.00	U
Methyl-t-Butyl Ether (MTBE)	<0.50	0.31	0.50	1.0	1.00	U
Gasoline Range Organics	<30	26	30	50	1.00	U

Surrogate	Rec. (%)	Control Limits	Qualifiers
Dibromofluoromethane	97	80-126	
1,2-Dichloroethane-d4	91	80-134	
Toluene-d8	100	80-120	
Toluene-d8-TPPH	99	88-112	
1,4-Bromofluorobenzene	96	80-120	

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Quality Control - Spike/Spike Duplicate

Environmental Science International, Inc.	Date Received:	07/24/14
354 Uluniu Street, Suite 304	Work Order:	14-07-1643
Kailua, HI 96734-2500	Preparation:	EPA 3005A Filt.
	Method:	EPA 6020
Project: Red Hill LTM 112066		Page 1 of 4

Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	MS/MSD Batch Number
ES111	**Sample**	**Aqueous**	**ICP/MS 03**	**07/25/14**	**07/28/14 16:26**	**140725S05C**
ES111	**Matrix Spike**	**Aqueous**	**ICP/MS 03**	**07/25/14**	**07/28/14 16:00**	**140725S05C**
ES111	**Matrix Spike Duplicate**	**Aqueous**	**ICP/MS 03**	**07/25/14**	**07/28/14 16:02**	**140725S05C**

Parameter	Sample Conc.	Spike Added	MS Conc.	MS %Rec.	MSD Conc.	MSD %Rec.	%Rec. CL	RPD	RPD CL	Qualifiers
Lead	ND	100.0	107.1	107	104.5	104	80-120	2	0-20	

RPD: Relative Percent Difference. CL: Control Limits

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Quality Control - Spike/Spike Duplicate

Environmental Science International, Inc.		Date Received:	07/24/14
354 Uluniu Street, Suite 304		Work Order:	14-07-1643
Kailua, HI 96734-2500		Preparation:	EPA 3510C
		Method:	EPA 8270C SIM PAHs
Project: Red Hill LTM 112066			Page 2 of 4

Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	MS/MSD Batch Number
14-07-1466-2	**Sample**	**Aqueous**	**GC/MS AAA**	**07/28/14**	**07/29/14 21:31**	**140728S01**
14-07-1466-2	**Matrix Spike**	**Aqueous**	**GC/MS AAA**	**07/28/14**	**07/29/14 13:52**	**140728S01**
14-07-1466-2	**Matrix Spike Duplicate**	**Aqueous**	**GC/MS AAA**	**07/28/14**	**07/29/14 14:16**	**140728S01**

Parameter	Sample Conc.	Spike Added	MS Conc.	MS %Rec.	MSD Conc.	MSD %Rec.	%Rec. CL	RPD	RPD CL	Qualifiers
Naphthalene	70.83	2.000	59.97	0	64.80	0	21-133	8	0-25	3
2-Methylnaphthalene	19.64	2.000	21.30	83	18.58	0	21-140	14	0-25	3
1-Methylnaphthalene	25.19	2.000	25.26	4	24.73	0	20-140	2	0-25	3
Acenaphthylene	ND	2.000	1.370	68	1.495	75	33-145	9	0-25	
Acenaphthene	0.5154	2.000	1.776	63	1.936	71	49-121	9	0-25	
Fluorene	0.2363	2.000	1.536	65	1.689	73	59-121	10	0-25	
Phenanthrene	ND	2.000	1.313	66	1.517	76	54-120	14	0-25	
Anthracene	ND	2.000	1.421	71	1.551	78	27-133	9	0-25	
Fluoranthene	ND	2.000	1.282	64	1.431	72	26-137	11	0-25	
Pyrene	ND	2.000	1.192	60	1.344	67	18-168	12	0-25	
Benzo (a) Anthracene	ND	2.000	1.252	63	1.416	71	33-143	12	0-25	
Chrysene	ND	2.000	1.298	65	1.459	73	17-168	12	0-25	
Benzo (k) Fluoranthene	ND	2.000	1.137	57	1.284	64	24-159	12	0-25	
Benzo (b) Fluoranthene	ND	2.000	1.117	56	1.282	64	24-159	14	0-25	
Benzo (a) Pyrene	ND	2.000	1.181	59	1.348	67	17-163	13	0-25	
Indeno (1,2,3-c,d) Pyrene	ND	2.000	1.190	60	1.329	66	10-171	11	0-25	
Dibenz (a,h) Anthracene	ND	2.000	1.195	60	1.342	67	10-219	12	0-25	
Benzo (g,h,i) Perylene	ND	2.000	1.252	63	1.389	69	10-227	10	0-25	

RPD: Relative Percent Difference. CL: Control Limits

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Quality Control - Spike/Spike Duplicate

Environmental Science International, Inc.		Date Received:	07/24/14
354 Uluniu Street, Suite 304		Work Order:	14-07-1643
Kailua, HI 96734-2500		Preparation:	EPA 5030C
		Method:	GC/MS / EPA 8260B
Project: Red Hill LTM 112066			Page 3 of 4

Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	MS/MSD Batch Number
14-07-1461-2	Sample	Aqueous	GC/MS OO	07/24/14	07/24/14 18:50	140724S011
14-07-1461-2	Matrix Spike	Aqueous	GC/MS OO	07/24/14	07/24/14 19:17	140724S011
14-07-1461-2	Matrix Spike Duplicate	Aqueous	GC/MS OO	07/24/14	07/24/14 19:45	140724S011

Parameter	Sample Conc.	Spike Added	MS Conc.	MS %Rec.	MSD Conc.	MSD %Rec.	%Rec. CL	RPD	RPD CL	Qualifiers
Acetone	ND	50.00	45.93	92	44.61	89	40-140	3	0-20	
Benzene	ND	50.00	52.61	105	52.43	105	80-120	0	0-20	
Bromodichloromethane	ND	50.00	53.02	106	53.40	107	75-120	1	0-20	
Bromoform	ND	50.00	50.11	100	50.93	102	70-130	2	0-20	
Bromomethane	ND	50.00	46.44	93	43.81	88	30-145	6	0-20	
2-Butanone	ND	50.00	45.72	91	45.90	92	30-150	0	0-20	
Carbon Tetrachloride	ND	50.00	51.80	104	50.78	102	65-140	2	0-20	
Chlorobenzene	ND	50.00	53.37	107	52.75	106	80-120	1	0-20	
Chloroethane	ND	50.00	43.75	87	41.78	84	60-135	5	0-20	
Chloroform	ND	50.00	51.48	103	51.48	103	65-135	0	0-20	
Chloromethane	ND	50.00	39.72	79	38.85	78	40-125	2	0-20	
Dibromochloromethane	ND	50.00	53.70	107	53.69	107	60-135	0	0-20	
1,2-Dibromo-3-Chloropropane	ND	50.00	44.59	89	43.62	87	50-130	2	0-20	
1,2-Dibromoethane	ND	50.00	51.00	102	50.60	101	80-120	1	0-20	
1,2-Dichlorobenzene	ND	50.00	51.70	103	51.57	103	70-120	0	0-20	
1,3-Dichlorobenzene	ND	50.00	52.13	104	52.22	104	75-125	0	0-20	
1,4-Dichlorobenzene	ND	50.00	49.74	99	49.43	99	75-125	1	0-20	
1,1-Dichloroethane	ND	50.00	50.78	102	49.85	100	70-135	2	0-20	
1,2-Dichloroethane	ND	50.00	50.54	101	50.80	102	70-130	1	0-20	
1,1-Dichloroethene	ND	50.00	53.61	107	53.12	106	70-130	1	0-20	
c-1,2-Dichloroethene	ND	50.00	57.55	115	56.84	114	70-125	1	0-20	
t-1,2-Dichloroethene	ND	50.00	56.94	114	56.18	112	60-140	1	0-20	
1,2-Dichloropropane	ND	50.00	52.36	105	51.62	103	75-125	1	0-20	
c-1,3-Dichloropropene	ND	50.00	55.22	110	55.11	110	70-130	0	0-20	
t-1,3-Dichloropropene	ND	50.00	52.67	105	53.51	107	55-140	2	0-20	
Ethylbenzene	ND	50.00	52.22	104	51.42	103	75-125	2	0-20	
Methylene Chloride	ND	50.00	56.25	112	54.64	109	55-140	3	0-20	
4-Methyl-2-Pentanone	ND	50.00	51.98	104	52.11	104	60-135	0	0-20	
Styrene	ND	50.00	52.76	106	50.71	101	65-135	4	0-20	
1,1,1,2-Tetrachloroethane	ND	50.00	50.52	101	50.22	100	80-130	1	0-20	
1,1,2,2-Tetrachloroethane	ND	50.00	52.22	104	52.68	105	65-130	1	0-20	
Tetrachloroethene	ND	50.00	46.24	92	45.42	91	45-150	2	0-20	
Toluene	ND	50.00	52.49	105	52.03	104	75-120	1	0-20	
1,2,4-Trichlorobenzene	ND	50.00	49.79	100	50.22	100	65-135	1	0-20	
1,1,1-Trichloroethane	ND	50.00	51.18	102	49.72	99	65-130	3	0-20	

RPD: Relative Percent Difference. CL: Control Limits

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Quality Control - Spike/Spike Duplicate

Environmental Science International, Inc.	Date Received: 07/24/14
354 Uluniu Street, Suite 304	Work Order: 14-07-1643
Kailua, HI 96734-2500	Preparation: EPA 5030C
	Method: GC/MS / EPA 8260B
Project: Red Hill LTM 112066	Page 4 of 4

Parameter	Sample Conc.	Spike Added	MS Conc.	MS %Rec.	MSD Conc.	MSD %Rec.	%Rec. CL	RPD	RPD CL	Qualifiers
Hexachloro-1,3-Butadiene	ND	50.00	46.88	94	46.51	93	50-140	1	0-20	
1,1,2-Trichloroethane	ND	50.00	51.87	104	51.99	104	75-125	0	0-20	
Trichloroethene	ND	50.00	52.23	104	51.54	103	70-125	1	0-20	
1,2,3-Trichloropropane	ND	50.00	49.12	98	48.80	98	75-125	1	0-20	
Vinyl Chloride	ND	50.00	43.56	87	41.00	82	50-145	6	0-20	
p/m-Xylene	ND	100.0	104.2	104	101.9	102	75-130	2	0-20	
o-Xylene	ND	50.00	54.00	108	53.89	108	80-120	0	0-20	
Methyl-t-Butyl Ether (MTBE)	1.625	50.00	51.99	101	52.57	102	65-125	1	0-20	

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RPD: Relative Percent Difference. CL: Control Limits

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Quality Control - PDS

Environmental Science International, Inc.		Date Received:	07/24/14
354 Uluniu Street, Suite 304		Work Order:	14-07-1643
Kailua, HI 96734-2500		Preparation:	EPA 3005A Filt.
		Method:	EPA 6020
Project: Red Hill LTM 112066			Page 1 of 1

Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	PDS/PDSD Batch Number
ES111	**Sample**	**Aqueous**	**ICP/MS 03**	**07/25/14 00:00**	**07/28/14 16:26**	**140725S05C**
ES111	**PDS**	**Aqueous**	**ICP/MS 03**	**07/25/14 00:00**	**07/28/14 16:03**	**140725S05C**

Parameter	Sample Conc.	Spike Added	PDS Conc.	PDS %Rec.	%Rec. CL	Qualifiers
Lead	ND	100.0	101.0	101	75-125	

RPD: Relative Percent Difference. CL: Control Limits

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Quality Control - LCS/LCSD

Environmental Science International, Inc.	Date Received: 07/24/14
354 Uluniu Street, Suite 304	Work Order: 14-07-1643
Kailua, HI 96734-2500	Preparation: EPA 3510C
	Method: EPA 8015B (M)
Project: Red Hill LTM 112066	Page 1 of 5

Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	LCS/LCSD Batch Number
099-15-516-160	**LCS**	**Aqueous**	**GC 46**	**07/25/14**	**07/26/14 08:17**	**140725B12**
099-15-516-160	**LCSD**	**Aqueous**	**GC 46**	**07/25/14**	**07/26/14 08:34**	**140725B12**

Parameter	Spike Added	LCS Conc.	LCS %Rec.	LCSD Conc.	LCSD %Rec.	%Rec. CL	RPD	RPD CL	Qualifiers
TPH as Diesel	4000	4417	110	4392	110	60-132	1	0-11	

RPD: Relative Percent Difference. CL: Control Limits

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Quality Control - LCS

Environmental Science International, Inc.		Date Received:	07/24/14
354 Uluniu Street, Suite 304		Work Order:	14-07-1643
Kailua, HI 96734-2500		Preparation:	EPA 3005A Filt.
		Method:	EPA 6020
Project: Red Hill LTM 112066			Page 2 of 5

Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	LCS Batch Number
099-14-497-88	**LCS**	**Aqueous**	**ICP/MS 03**	**07/25/14**	**07/28/14 15:58**	**140725L05D**

Parameter	Spike Added	Conc. Recovered	LCS %Rec.	%Rec. CL	Qualifiers
Lead	100.0	101.6	102	80-120	

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RPD: Relative Percent Difference. CL: Control Limits

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Quality Control - LCS

Environmental Science International, Inc.		Date Received:	07/24/14
354 Uluniu Street, Suite 304		Work Order:	14-07-1643
Kailua, HI 96734-2500		Preparation:	EPA 3510C
		Method:	EPA 8270C SIM PAHs
Project: Red Hill LTM 112066			Page 3 of 5

Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	LCS Batch Number
099-15-148-52	LCS	Aqueous	GC/MS AAA	07/28/14	07/29/14 13:28	140728L01

Parameter	Spike Added	Conc. Recovered	LCS %Rec.	%Rec. CL	Qualifiers
Naphthalene	2.000	1.361	68	21-133	
2-Methylnaphthalene	2.000	1.230	61	21-140	
1-Methylnaphthalene	2.000	1.226	61	20-140	
Acenaphthylene	2.000	1.167	58	33-145	
Acenaphthene	2.000	1.271	64	55-121	
Fluorene	2.000	1.315	66	59-121	
Phenanthrene	2.000	1.379	69	54-120	
Anthracene	2.000	1.393	70	27-133	
Fluoranthene	2.000	1.385	69	26-137	
Pyrene	2.000	1.333	67	45-129	
Benzo (a) Anthracene	2.000	1.343	67	33-143	
Chrysene	2.000	1.447	72	17-168	
Benzo (k) Fluoranthene	2.000	1.265	63	24-159	
Benzo (b) Fluoranthene	2.000	1.294	65	24-159	
Benzo (a) Pyrene	2.000	1.273	64	17-163	
Indeno (1,2,3-c,d) Pyrene	2.000	1.408	70	25-175	
Dibenz (a,h) Anthracene	2.000	1.350	67	25-175	
Benzo (g,h,i) Perylene	2.000	1.500	75	25-157	

RPD: Relative Percent Difference. CL: Control Limits

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Quality Control - LCS/LCSD

Environmental Science International, Inc.		Date Received:	07/24/14
354 Uluniu Street, Suite 304		Work Order:	14-07-1643
Kailua, HI 96734-2500		Preparation:	EPA 5030C
		Method:	GC/MS / EPA 8260B
Project: Red Hill LTM 112066			Page 4 of 5

Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	LCS/LCSD Batch Number
099-13-057-59	LCS	Aqueous	GC/MS OO	07/24/14	07/24/14 15:56	140724L018
099-13-057-59	LCSD	Aqueous	GC/MS OO	07/24/14	07/24/14 16:23	140724L018

Parameter	Spike Added	LCS Conc.	LCS %Rec.	LCSD Conc.	LCSD %Rec.	%Rec. CL	RPD	RPD CL	Qualifiers
Acetone	50.00	100.6	201	N/A	N/A	40-140	N/A	0-20	X
Benzene	50.00	49.87	100	N/A	N/A	80-120	N/A	0-20	
Bromodichloromethane	50.00	50.57	101	N/A	N/A	75-120	N/A	0-20	
Bromoform	50.00	50.14	100	N/A	N/A	70-130	N/A	0-20	
Bromomethane	50.00	45.86	92	N/A	N/A	30-145	N/A	0-20	
2-Butanone	50.00	70.70	141	N/A	N/A	30-150	N/A	0-20	
Carbon Tetrachloride	50.00	48.42	97	N/A	N/A	65-140	N/A	0-20	
Chlorobenzene	50.00	51.13	102	N/A	N/A	80-120	N/A	0-20	
Chloroethane	50.00	44.62	89	N/A	N/A	60-135	N/A	0-20	
Chloroform	50.00	48.66	97	N/A	N/A	65-135	N/A	0-20	
Chloromethane	50.00	42.01	84	N/A	N/A	40-125	N/A	0-20	
Dibromochloromethane	50.00	52.41	105	N/A	N/A	60-135	N/A	0-20	
1,2-Dibromo-3-Chloropropane	50.00	44.48	89	N/A	N/A	50-130	N/A	0-20	
1,2-Dibromoethane	50.00	50.10	100	N/A	N/A	80-120	N/A	0-20	
1,2-Dichlorobenzene	50.00	49.86	100	N/A	N/A	70-120	N/A	0-20	
1,3-Dichlorobenzene	50.00	49.93	100	N/A	N/A	75-125	N/A	0-20	
1,4-Dichlorobenzene	50.00	47.74	95	N/A	N/A	75-125	N/A	0-20	
1,1-Dichloroethane	50.00	49.47	99	N/A	N/A	70-135	N/A	0-20	
1,2-Dichloroethane	50.00	48.26	97	N/A	N/A	70-130	N/A	0-20	
1,1-Dichloroethene	50.00	50.71	101	N/A	N/A	70-130	N/A	0-20	
c-1,2-Dichloroethene	50.00	54.23	108	N/A	N/A	70-125	N/A	0-20	
t-1,2-Dichloroethene	50.00	54.07	108	N/A	N/A	60-140	N/A	0-20	
1,2-Dichloropropane	50.00	50.01	100	N/A	N/A	75-125	N/A	0-20	
c-1,3-Dichloropropene	50.00	54.58	109	N/A	N/A	70-130	N/A	0-20	
t-1,3-Dichloropropene	50.00	53.36	107	N/A	N/A	55-140	N/A	0-20	
Ethylbenzene	50.00	49.29	99	N/A	N/A	75-125	N/A	0-20	
Methylene Chloride	50.00	54.05	108	N/A	N/A	55-140	N/A	0-20	
4-Methyl-2-Pentanone	50.00	50.83	102	N/A	N/A	60-135	N/A	0-20	
Styrene	50.00	50.98	102	N/A	N/A	65-135	N/A	0-20	
1,1,1,2-Tetrachloroethane	50.00	48.64	97	N/A	N/A	80-130	N/A	0-20	
1,1,2,2-Tetrachloroethane	50.00	48.25	96	N/A	N/A	65-130	N/A	0-20	
Tetrachloroethene	50.00	52.74	105	N/A	N/A	45-150	N/A	0-20	
Toluene	50.00	49.72	99	N/A	N/A	75-120	N/A	0-20	
1,2,4-Trichlorobenzene	50.00	49.28	99	N/A	N/A	65-135	N/A	0-20	
1,1,1-Trichloroethane	50.00	47.96	96	N/A	N/A	65-130	N/A	0-20	
Hexachloro-1,3-Butadiene	50.00	44.80	90	N/A	N/A	50-140	N/A	0-20	

RPD: Relative Percent Difference. CL: Control Limits

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Quality Control - LCS/LCSD

Environmental Science International, Inc.	Date Received:	07/24/14
354 Uluniu Street, Suite 304	Work Order:	14-07-1643
Kailua, HI 96734-2500	Preparation:	EPA 5030C
	Method:	GC/MS / EPA 8260B
Project: Red Hill LTM 112066		Page 5 of 5

Parameter	Spike Added	LCS Conc.	LCS %Rec.	LCSD Conc.	LCSD %Rec.	%Rec. CL	RPD	RPD CL	Qualifiers
1,1,2-Trichloroethane	50.00	50.58	101	N/A	N/A	75-125	N/A	0-20	
Trichloroethene	50.00	50.61	101	N/A	N/A	70-125	N/A	0-20	
1,2,3-Trichloropropane	50.00	47.18	94	N/A	N/A	75-125	N/A	0-20	
Vinyl Chloride	50.00	44.69	89	N/A	N/A	50-145	N/A	0-20	
p/m-Xylene	100.0	98.41	98	N/A	N/A	75-130	N/A	0-20	
o-Xylene	50.00	51.83	104	N/A	N/A	80-120	N/A	0-20	
Methyl-t-Butyl Ether (MTBE)	50.00	49.42	99	N/A	N/A	65-125	N/A	0-20	
Gasoline Range Organics	1000	987.2	99	992.5	99	80-120	1	0-20	

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RPD: Relative Percent Difference. CL: Control Limits

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Sample Analysis Summary Report

Work Order: 14-07-1643 Page 1 of 1

Method	Extraction	Chemist ID	Instrument	Analytical Location
EPA 6020	EPA 3005A Filt.	598	ICP/MS 03	1
EPA 8015B (M)	EPA 3510C	847	GC 46	1
EPA 8270C SIM PAHs	EPA 3510C	923	GC/MS AAA	1
GC/MS / EPA 8260B	EPA 5030C	849	GC/MS OO	2

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Glossary of Terms and Qualifiers

Work Order: 14-07-1643 Page 1 of 1

Qualifiers	Definition
*	See applicable analysis comment.
<	Less than the indicated value.
>	Greater than the indicated value.
1	Surrogate compound recovery was out of control due to a required sample dilution. Therefore, the sample data was reported without further clarification.
2	Surrogate compound recovery was out of control due to matrix interference. The associated method blank surrogate spike compound was in control and, therefore, the sample data was reported without further clarification.
3	Recovery of the Matrix Spike (MS) or Matrix Spike Duplicate (MSD) compound was out of control due to suspected matrix interference. The associated LCS recovery was in control.
4	The MS/MSD RPD was out of control due to suspected matrix interference.
5	The PDS/PDSD or PES/PESD associated with this batch of samples was out of control due to suspected matrix interference.
6	Surrogate recovery below the acceptance limit.
7	Surrogate recovery above the acceptance limit.
B	Analyte was present in the associated method blank.
BU	Sample analyzed after holding time expired.
BV	Sample received after holding time expired.
DL	The Detection Limit (DL) is the smallest analyte concentration that can be demonstrated to be different from zero or a blank concentration at the 99% level of confidence.
E	Concentration exceeds the calibration range.
ET	Sample was extracted past end of recommended max. holding time.
HD	The chromatographic pattern was inconsistent with the profile of the reference fuel standard.
ICH	Initial calibration verification recovery is above the control limit for this analyte.
ICJ	Initial calibration verification recovery is below the control limit for this analyte.
IH	Calibration verification recovery is above the control limit for this analyte.
IJ	Calibration verification recovery is below the control limit for this analyte.
J	Analyte was detected at a concentration below the LOQ and above the DL. Reported value is estimated.
JA	Analyte positively identified but quantitation is an estimate.
LOD	The Limit of Detection (LOD) is the smallest amount or concentration of a substance that must be present in a sample in order to be detected at 99% confidence level.
LOQ	The Limit of Quantitation (LOQ) is the lowest concentration of a substance that produces a quantitative result within specified limits of precision and bias.
Q	Spike recovery and RPD control limits do not apply resulting from the parameter concentration in the sample exceeding the spike concentration by a factor of four or greater.
SG	The sample extract was subjected to Silica Gel treatment prior to analysis.
U	Undetected at Detection Limit (DL) and is reported as less than the Limit of Detection (LOD).
X	% Recovery and/or RPD out-of-range.
Z	Analyte presence was not confirmed by second column or GC/MS analysis.
	Solid - Unless otherwise indicated, solid sample data is reported on a wet weight basis, not corrected for % moisture. All QC results are reported on a wet weight basis.
	Any parameter identified in 40CFR Part 136.3 Table II that is designated as "analyze immediately" with a holding time of <= 15 minutes (40CFR-136.3 Table II, footnote 4), is considered a "field" test and the reported results will be qualified as being received outside of the stated holding time unless received at the laboratory within 15 minutes of the collection time.
	A calculated total result (Example: Total Pesticides) is the summation of each component concentration and/or, if "J" flags are reported, estimated concentration. Component concentrations showing not detected (ND) are summed into the calculated total result as zero concentrations.

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Calscience Environmental Laboratories, Inc.

7440 Lincoln Way, Garden Grove, CA 92841-1427 • (714) 895-5494
Other locations: Concord, San Luis Obispo, Houston, and Corpus Christi
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contact sales@calscience.com or call us.

CHAIN OF CUSTODY RECORD

WO # / LAB USE ONLY: **14-07-1643**

Date 7/23/14

Page 1 of 1

LABORATORY CLIENT: Environmental Science International

ADDRESS: 354 Uluniu St. Suite 304

CITY: Kailua STATE: HI ZIP: 96734

TEL: 808-261-0740 E-MAIL: rchong@ecsciences.com dfeher@ecsciences.com

CLIENT PROJECT NAME / NUMBER: Red Hill 112066

P.O. NO.:

PROJECT CONTACT: Robert Chong

SAMPLER(S): (PRINT) Jeff Hoffmeyer, Kirk Mudie

TURNAROUND TIME (Rush surcharges may apply to any TAT not "STANDARD"):
☐ SAME DAY ☐ 24 HR ☐ 48 HR ☐ 72 HR ☐ 5 DAYS ☒ STANDARD

☐ COELT EDF | GLOBAL ID | LOG CODE

SPECIAL INSTRUCTIONS:

REQUESTED ANALYSES

Please check box or fill in blank as needed.

LAB USE ONLY	SAMPLE ID	SAMPLING DATE	SAMPLING TIME	MATRIX	NO. OF CONT.	Unpreserved	Preserved	Field Filtered	TPH(g) ☐ GRO (8260)	TPH(d) ☐ DRO (8015)	TPH ☐ C6-C36 ☐ C6-C44	TPH ____	BTEX / MTBE ☐ 8260 ☐ ____	VOCs (8260)	Oxygenates (8260)	Prep (5035) ☐ En Core ☐ Terra Core	SVOCs (8270)	Pesticides (8081)	PCBs (8082)	PAHs ☐ 8270 ☒ 8270 SIM	T22 Metals ☐ 6010/747X ☐ 6020/747X	Cr(VI) ☐ 7196 ☐ 7199 ☐ 218.6	Lead (6020)	Lead (200.8)		
1	ES111	7/23/14	1000	water	10		X	X	X	X				X						X			X		
2	ES112	7/23/14	1355	water	10		X	X	X	X				X						X			X		
3	ESTRIP	7/23/14	0800	water	3		X		X					X											

Relinquished by: (Signature) Jeff Hoffmeyer	Received by: (Signature/Affiliation)	Date: 7/23/14	Time: 1430
Relinquished by: (Signature) (Fedex)	Received by: (Signature/Affiliation) EC	Date: 7/24/14	Time: 0935
Relinquished by: (Signature)	Received by: (Signature/Affiliation)	Date:	Time:

DISTRIBUTION: White with final report, Green and Yellow to Client.
Please note that pages 1 and 2 of 2 of our T/Cs are printed on the reverse side of the Green and Yellow copies, respectively.

01/01/14 Revision

Return to Contents

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WORK ORDER #: 14-07-1643

SAMPLE RECEIPT FORM

Cooler 1 of 1

CLIENT: Env'l., Science Int'l. DATE: 07/24/14

TEMPERATURE: Thermometer ID: SC1 (Criteria: 0.0 °C – 6.0 °C, not frozen except sediment/tissue)

Temperature 3.6 °C - 0.3 °C (CF) = 3.3 °C ☑ Blank ☐ Sample

☐ Sample(s) outside temperature criteria (PM/APM contacted by: _____)

☐ Sample(s) outside temperature criteria but received on ice/chilled on same day of sampling.

☐ Received at ambient temperature, placed on ice for transport by Courier.

Ambient Temperature: ☐ Air ☐ Filter Checked by: SM

CUSTODY SEALS INTACT:

☑ Cooler ☐_____ ☐ No (Not Intact) ☐ Not Present ☐ N/A Checked by: SM

☑ Sample ☐_____ ☐ No (Not Intact) ☑ Not Present SM 7/24/14 Checked by: SM

SAMPLE CONDITION:	Yes	No	N/A
Chain-Of-Custody (COC) document(s) received with samples	☑	☐	☐
COC document(s) received complete	☑	☐	☐
☐ Collection date/time, matrix, and/or # of containers logged in based on sample labels.			
☐ No analysis requested. ☐ Not relinquished. ☐ No date/time relinquished.			
Sampler's name indicated on COC	☑	☐	☐
Sample container label(s) consistent with COC	☑	☐	☐
Sample container(s) intact and good condition	☑	☐	☐
Proper containers and sufficient volume for analyses requested	☑	☐	☐
Analyses received within holding time	☑	☐	☐
Aqueous samples received within 15-minute holding time			
☐ pH ☐ Residual Chlorine ☐ Dissolved Sulfides ☐ Dissolved Oxygen	☐	☐	☑
Proper preservation noted on COC or sample container	☑	☐	☐
☑ Unpreserved vials received for Volatiles analysis			
Volatile analysis container(s) free of headspace	☑	☐	☐
Tedlar bag(s) free of condensation	☐	☐	☑

CONTAINER TYPE:

Solid: ☐4ozCGJ ☐8ozCGJ ☐16ozCGJ ☐Sleeve (_____) ☐EnCores® ☐TerraCores® ☐_____

Aqueous: ☑VOA (6) ☑VOAh (3) ☐VOA**na₂** ☐125AGB ☐125AGB**h** ☐125AGB**p** ☑1AGB (2) ☐1AGB**na₂** ☐1AGB**s**

☐500AGB ☑500AGJ ☐500AGJ**s** ☐250AGB ☐250CGB ☐250CGB**s** ☐1PB ☐1PB**na** ☐500PB

☐250PB ☑250PB**n** ☐125PB ☐125PB**znna** ☐100PJ ☐100PJ**na₂** ☐_____ ☐_____ ☐_____

Air: ☐Tedlar® ☐Canister **Other:** ☐_____ **Trip Blank Lot#:** 131007B **Labeled/Checked by:** SM

Container: **C:** Clear **A:** Amber **P:** Plastic **G:** Glass **J:** Jar **B:** Bottle **Z:** Ziploc/Resealable Bag **E:** Envelope **Reviewed by:** TG

Preservative: **h:** HCL **n:** HNO_3 **na₂:**$Na_2S_2O_3$ **na:** NaOH **p:** H_3PO_4 **s:** H_2SO_4 **u:** Ultra-pure **znna:** $ZnAc_2$+NaOH **f:** Filtered **Scanned by:** TG

RAW DATA SHEET
FOR METHOD: EPA 8015B (M)

WORK ORDER:	**14-07-1643**	ANALYZED BY:	847
INSTRUMENT:	GC 46	D/T ANALYZED:	2014-07-26 11:30
EXTRACTION:	EPA 3510C	REVIEWED BY:	
D/T EXTRACTED:	2014-07-25 00:00	D/T REVIEWED:	

DATA FILE: W:\GC_45_46\DATA\GC46\2014\140725\14072571.D\14072571

 # 1 **CLIENT SAMPLE NUMBER: ES111**

LCS/MB BATCH:	140725B12	SAMPLE VOLUME / WEIGHT:	DEFAULT: 500.00 ml / ACTUAL: 500.00 ml
MS/MSD BATCH:		FINAL VOLUME / WEIGHT:	DEFAULT: 5.00 ml / ACTUAL: 2.50 ml
UNITS:	ug/L	ADJUSTMENT RATIO TO PF:	0.50

COMMENT: Results were evaluated to the MDL (DL), concentrations >= to the MDL (DL) but < RL (LOQ), if found, are qualified with a "J" flag.

COMPOUND	INI. CONC	DF	CONC	DL	LOD	LOQ	QUAL
TPH as Diesel	143	1.00	ND	11	12	25	

Area Percent Report

Data File Name : W:\GC_45_46\DATA\GC46\2014\140725\14072571.D
Page Number : 1
Operator : 847
Instrument : GC 46
Sample Name : 14-07-1643-1

Vial Number : Vial 71
Injection Number : 1
Sequence Line : 71
Instrument Method: C:\CHEM32\2\METHODS\ ->

Acquired on : 26 Jul 14 11:30 am
Report Created on: 28 Jul 14 02:24 pm

Analysis Method : 8015B.MTH

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Sig. 1 in W:\GC_45_46\DATA\GC46\2014\140725->

Pk	Ret Time	Area	Height	Peak	Width	Response %
1	4.887	0.41	0	VV	0.023	0.079
2	4.948	0.37	0	VV	0.029	0.070
3	5.027	0.78	0	VV	0.024	0.149
4	5.169	0.74	1	VV	0.020	0.142
5	5.215	0.20	0	VV	0.025	0.038
6	5.307	518.59	371	VV	0.021	99.521

Total area = 521.09

Area Percent Report

Data File Name : W:\GC_45_46\DATA\GC46\2014\140725\14072571.D
Page Number : 2
Operator : 847
Instrument : GC 46
Sample Name : 14-07-1643-1

Acquired on : 26 Jul 14 11:30 am
Report Created on: 28 Jul 14 02:24 pm

Vial Number : Vial 71
Injection Number : 1
Sequence Line : 71
Instrument Method: C:\CHEM32\2\METHODS\ ->

Analysis Method : 8015B.MTH

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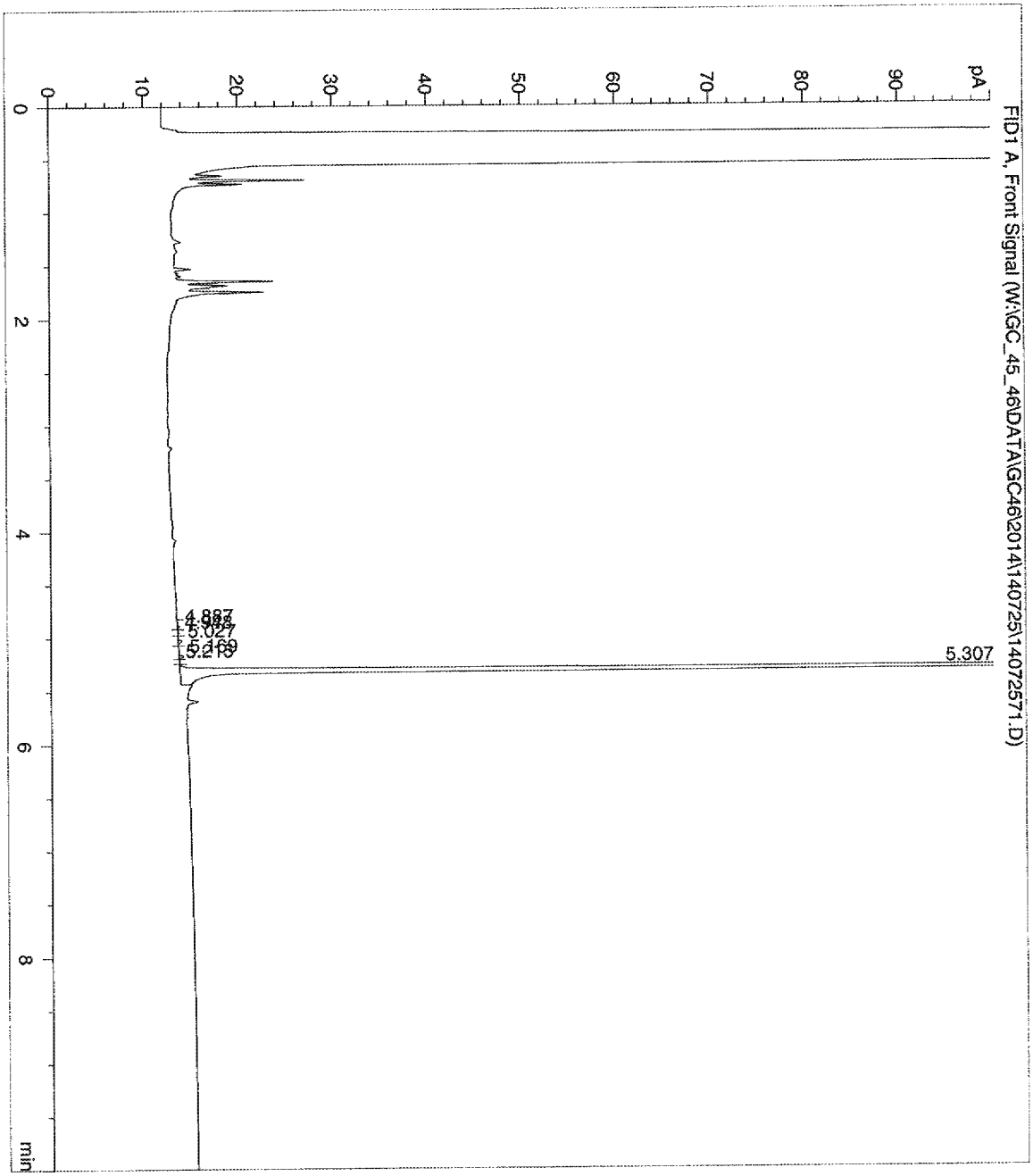

RAW DATA SHEET
FOR METHOD: EPA 8015B (M)

WORK ORDER:	**14-07-1643**	ANALYZED BY:	847
INSTRUMENT:	GC 46	D/T ANALYZED:	2014-07-26 11:47
EXTRACTION:	EPA 3510C	REVIEWED BY:	
D/T EXTRACTED:	2014-07-25 00:00	D/T REVIEWED:	

DATA FILE: W:\GC_45_46\DATA\GC46\2014\140725\14072572.D\14072572

 # 2 **CLIENT SAMPLE NUMBER: ES112**

LCS/MB BATCH:	140725B12	SAMPLE VOLUME / WEIGHT:	DEFAULT: 500.00 ml / ACTUAL: 500.00 ml
MS/MSD BATCH:		FINAL VOLUME / WEIGHT:	DEFAULT: 5.00 ml / ACTUAL: 2.50 ml
UNITS:	ug/L	ADJUSTMENT RATIO TO PF:	0.50

COMMENT: Results were evaluated to the MDL (DL), concentrations >= to the MDL (DL) but < RL (LOQ), if found, are qualified with a "J" flag.

COMPOUND	INI. CONC	DF	CONC	DL	LOD	LOQ	QUAL
TPH as Diesel	3360	1.00	16.8	11	12	25	bJ

Area Percent Report

Data File Name : W:\GC_45_46\DATA\GC46\2014\140725\14072572.D
Page Number : 1
Operator : 847
Instrument : GC 46
Sample Name : 14-07-1643-2

Vial Number : Vial 72
Injection Number : 1
Sequence Line : 72
Instrument Method: C:\CHEM32\2\METHODS\ ->

Acquired on : 26 Jul 14 11:47 am
Report Created on: 28 Jul 14 02:21 pm

Analysis Method : 8015B.MTH

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Sig. 1 in W:\GC_45_46\DATA\GC46\2014\140725->

Pk	Ret Time	Area	Height	Peak	Width	Response %
1	1.970	10.07	1	VV	0.097	1.748
2	2.270	1.20	0	VB	0.059	0.208
3	2.545	0.25	0	BV	0.043	0.043
4	2.626	7.81	2	VB	0.047	1.355
5	3.011	0.60	0	VV	0.039	0.104
6	3.122	0.48	0	VV	0.025	0.084
7	3.198	0.60	1	VV	0.019	0.104
8	3.244	26.64	10	VV	0.037	4.623
9	3.445	1.30	0	VV	0.052	0.225
10	3.538	0.67	0	VV	0.047	0.116
11	3.651	1.11	0	VV	0.046	0.193
12	3.726	0.22	0	VV	0.029	0.039
13	3.806	0.53	0	VV	0.030	0.092
14	3.839	2.99	1	VV	0.045	0.519
15	3.957	0.41	0	VB	0.032	0.071
16	4.076	1.41	0	BV	0.046	0.245
17	4.944	0.66	0	VV	0.029	0.115
18	5.022	0.82	0	VB	0.026	0.142
19	5.163	0.73	1	BV	0.020	0.127
20	5.301	517.69	373	VV	0.022	89.845

Total area = 576.20

Area Percent Report

Data File Name : W:\GC_45_46\DATA\GC46\2014\140725\14072572.D
Page Number : 2
Operator : 847
Instrument : GC 46
Sample Name : 14-07-1643-2

Acquired on : 26 Jul 14 11:47 am
Report Created on: 28 Jul 14 02:21 pm

Vial Number : Vial 72
Injection Number : 1
Sequence Line : 72
Instrument Method: C:\CHEM32\2\METHODS\ ->

Analysis Method : 8015B.MTH

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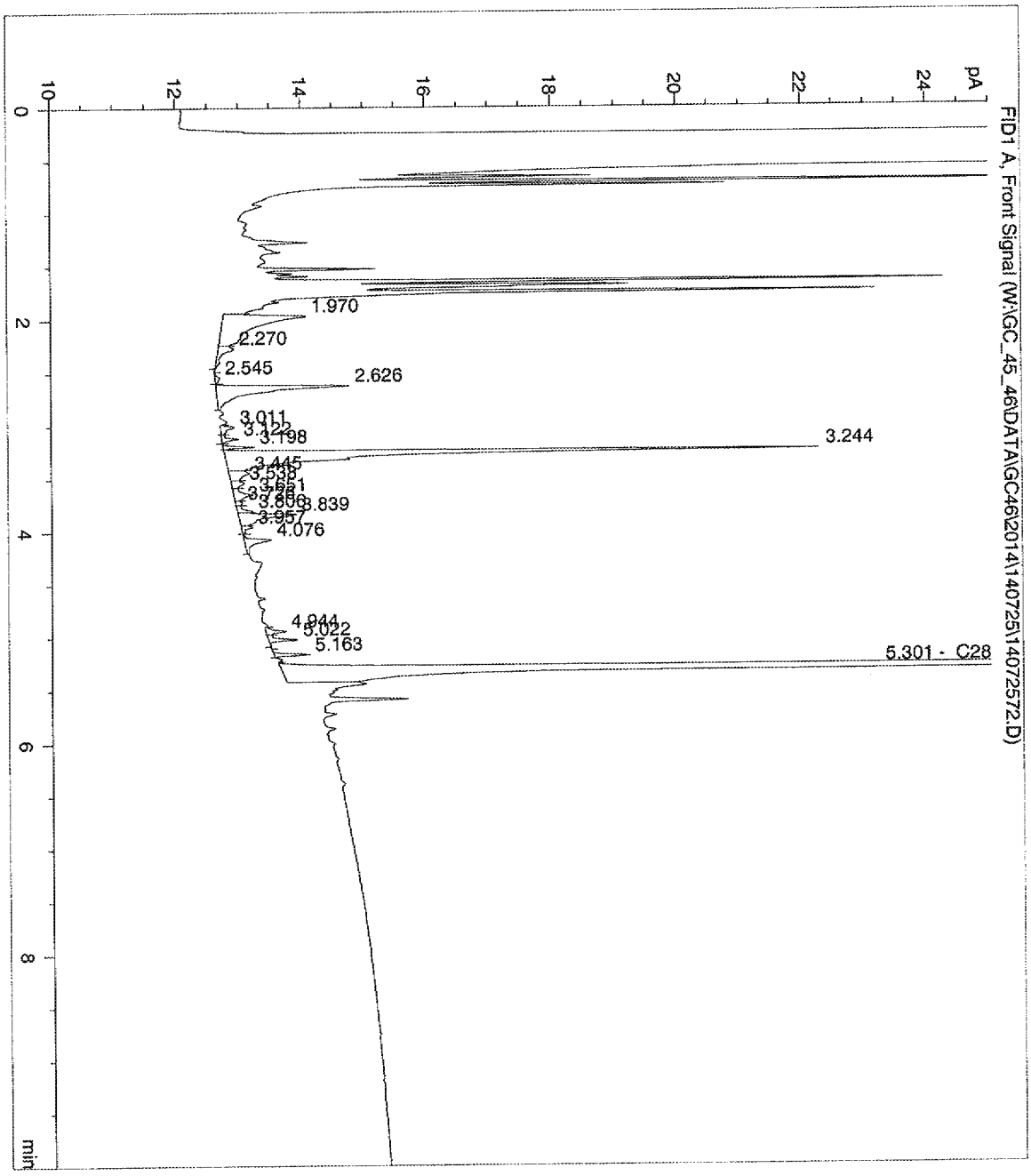

Area Percent Report

Data File Name : W:\GC_45_46\DATA\GC46\2014\140725\14072559.D
Page Number : 1
Operator : 847
Instrument : GC 46
Sample Name : MB 14072512/13

Vial Number : Vial 59
Injection Number : 1
Sequence Line : 59
Instrument Method: C:\CHEM32\2\METHODS\ ->

Acquired on : 26 Jul 14 08:00 am
Report Created on: 29 Jul 14 02:33 pm

Analysis Method : 8015B.MTH

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Sig. 1 in W:\GC_45_46\DATA\GC46\2014\140725->

Pk	Ret Time	Area	Height	Peak	Width	Response %
1	5.307	484.61	353	VV	0.021	100.000

Total area = 484.61

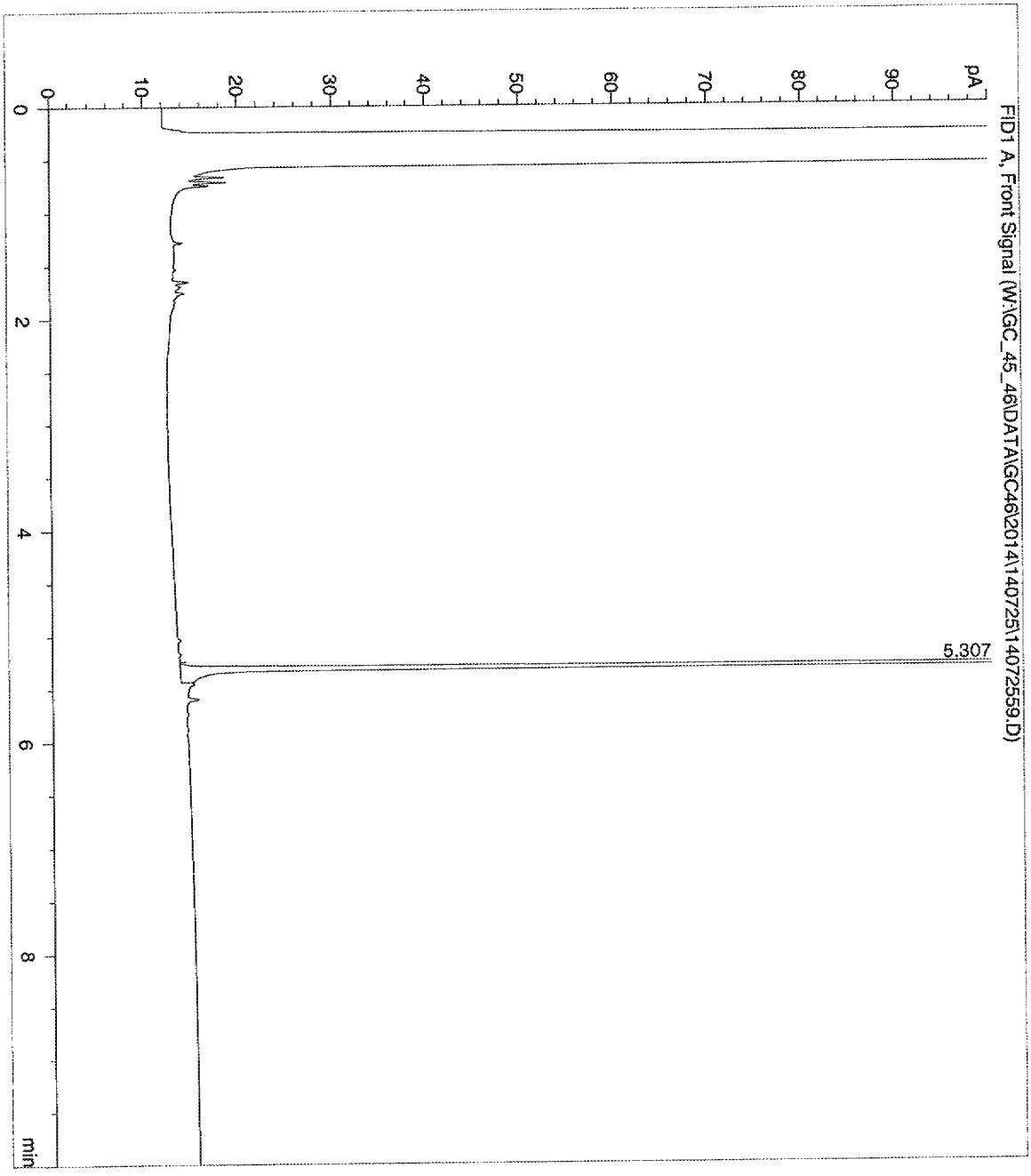
Area Percent Report

Data File Name : W:\GC_45_46\DATA\GC46\2014\140725\14072559.D
Page Number : 2
Operator : 847
Instrument : GC 46
Sample Name : MB 14072512/13

Vial Number : Vial 59
Injection Number : 1
Sequence Line : 59
Instrument Method: C:\CHEM32\2\METHODS\ ->

Acquired on : 26 Jul 14 08:00 am
Report Created on: 29 Jul 14 02:33 pm

Analysis Method : 8015B.MTH



Blank

Area Percent Report

Data File Name : W:\GC_45_46\DATA\GC46\2014\140725\14072560.D
Page Number : 1
Operator : 847
Instrument : GC 46
Sample Name : LCS 14072512

Vial Number : Vial 60
Injection Number : 1
Sequence Line : 60
Instrument Method: C:\CHEM32\2\METHODS\ ->

Acquired on : 26 Jul 14 08:17 am
Report Created on: 29 Jul 14 02:33 pm

Analysis Method : 8015B.MTH

Sig. 1 in W:\GC_45_46\DATA\GC46\2014\140725->

Pk	Ret Time	Area	Height	Peak	Width	Response %
1	0.653	3.46	3	BV	0.016	0.042
2	0.701	5.85	5	VV	0.017	0.071
3	0.734	4.91	3	VV	0.024	0.060
4	0.846	0.66	0	VV	0.037	0.008
5	0.911	4.05	3	VV	0.020	0.049
6	0.960	1.05	0	VV	0.032	0.013
7	1.013	0.49	0	VV	0.020	0.006
8	1.094	2.92	2	VV	0.021	0.036
9	1.141	7.72	3	VV	0.031	0.094
10	1.189	3.27	2	VV	0.023	0.040
11	1.220	2.57	2	VV	0.018	0.031
12	1.246	5.35	4	VV	0.021	0.065
13	1.273	3.55	2	VV	0.021	0.043
14	1.358	21.62	7	VV	0.042	0.264
15	1.433	8.91	6	VV	0.023	0.109
16	1.471	7.24	6	VV	0.018	0.088
17	1.493	13.47	6	VV	0.028	0.165
18	1.552	23.10	9	VV	0.036	0.282
19	1.616	24.65	11	VV	0.030	0.301
20	1.643	6.70	7	VV	0.015	0.082
21	1.700	38.83	17	VV	0.031	0.474
22	1.725	20.01	10	VV	0.029	0.244
23	1.800	47.83	21	VV	0.033	0.584
24	1.830	36.35	17	VV	0.033	0.444
25	1.875	38.97	20	VV	0.027	0.476
26	1.918	51.89	35	VV	0.022	0.634
27	1.980	61.45	23	VV	0.035	0.751
28	2.024	61.09	28	VV	0.031	0.746
29	2.106	179.09	49	VV	0.047	2.187
30	2.206	205.49	92	VV	0.031	2.510
31	2.269	138.00	47	VV	0.038	1.686
32	2.315	81.71	42	VV	0.027	0.998
33	2.372	266.91	63	VV	0.053	3.260
34	2.469	350.23	117	VV	0.039	4.278
35	2.543	68.57	41	VV	0.023	0.838
36	2.586	151.60	52	VV	0.037	1.852
37	2.641	222.99	65	VV	0.044	2.724
38	2.713	319.67	118	VV	0.036	3.905
39	2.800	107.87	50	VV	0.030	1.318
40	2.831	93.08	58	VV	0.023	1.137
41	2.881	196.18	66	VV	0.040	2.396
42	3.067	392.29	80	VV	0.063	4.792
43	3.116	64.40	53	VV	0.017	0.787
44	3.156	399.78	126	VV	0.042	4.883
45	3.281	353.57	72	VV	0.062	4.319

Area Percent Report

Data File Name : W:\GC_45_46\DATA\GC46\2014\140725\14072560.D
Page Number : 2
Operator : 847
Instrument : GC 46
Sample Name : LCS 14072512

Vial Number : Vial 60
Injection Number : 1
Sequence Line : 60
Instrument Method: C:\CHEM32\2\METHODS\ ->

Acquired on : 26 Jul 14 08:17 am
Report Created on: 29 Jul 14 02:33 pm

Analysis Method : 8015B.MTH

Pk	Ret Time	Area	Height	Peak	Width	Response %
46	3.359	299.63	128	VV	0.032	3.660
47	3.401	81.99	60	VV	0.019	1.001
48	3.448	238.26	97	VV	0.034	2.910
49	3.484	211.01	76	VV	0.037	2.577
50	3.635	222.87	83	VV	0.036	2.722
51	3.679	221.42	79	VV	0.038	2.705
52	3.739	418.73	154	VV	0.039	5.115
53	3.811	194.94	69	VV	0.038	2.381
54	3.844	79.75	64	VV	0.018	0.974
55	3.862	99.09	64	VV	0.022	1.210
56	3.911	306.68	98	VV	0.040	3.746
57	3.979	141.88	54	VV	0.039	1.733
58	4.019	148.73	50	VV	0.039	1.817
59	4.080	197.53	71	VV	0.038	2.413
60	4.144	103.78	39	VV	0.036	1.268
61	4.197	95.41	37	VV	0.034	1.165
62	4.244	192.08	45	VV	0.054	2.346
63	4.340	75.99	23	VV	0.045	0.928
64	4.405	67.44	27	VV	0.034	0.824
65	4.454	77.20	16	VV	0.062	0.943
66	4.563	75.31	13	VV	0.070	0.920
67	4.716	31.77	6	VV	0.064	0.388
68	4.867	11.73	2	VV	0.065	0.143
69	5.017	3.98	1	VV	0.043	0.049
70	5.161	0.77	1	VV	0.024	0.009
71	5.300	489.57	359	VV	0.021	5.980

Total area = 8186.88

Area Percent Report

Data File Name : W:\GC_45_46\DATA\GC46\2014\140725\14072560.D
Page Number : 3
Operator : 847
Instrument : GC 46
Sample Name : LCS 14072512

Vial Number : Vial 60
Injection Number : 1
Sequence Line : 60
Instrument Method: C:\CHEM32\2\METHODS\ ->

Acquired on : 26 Jul 14 08:17 am
Report Created on: 29 Jul 14 02:33 pm

Analysis Method : 8015B.MTH

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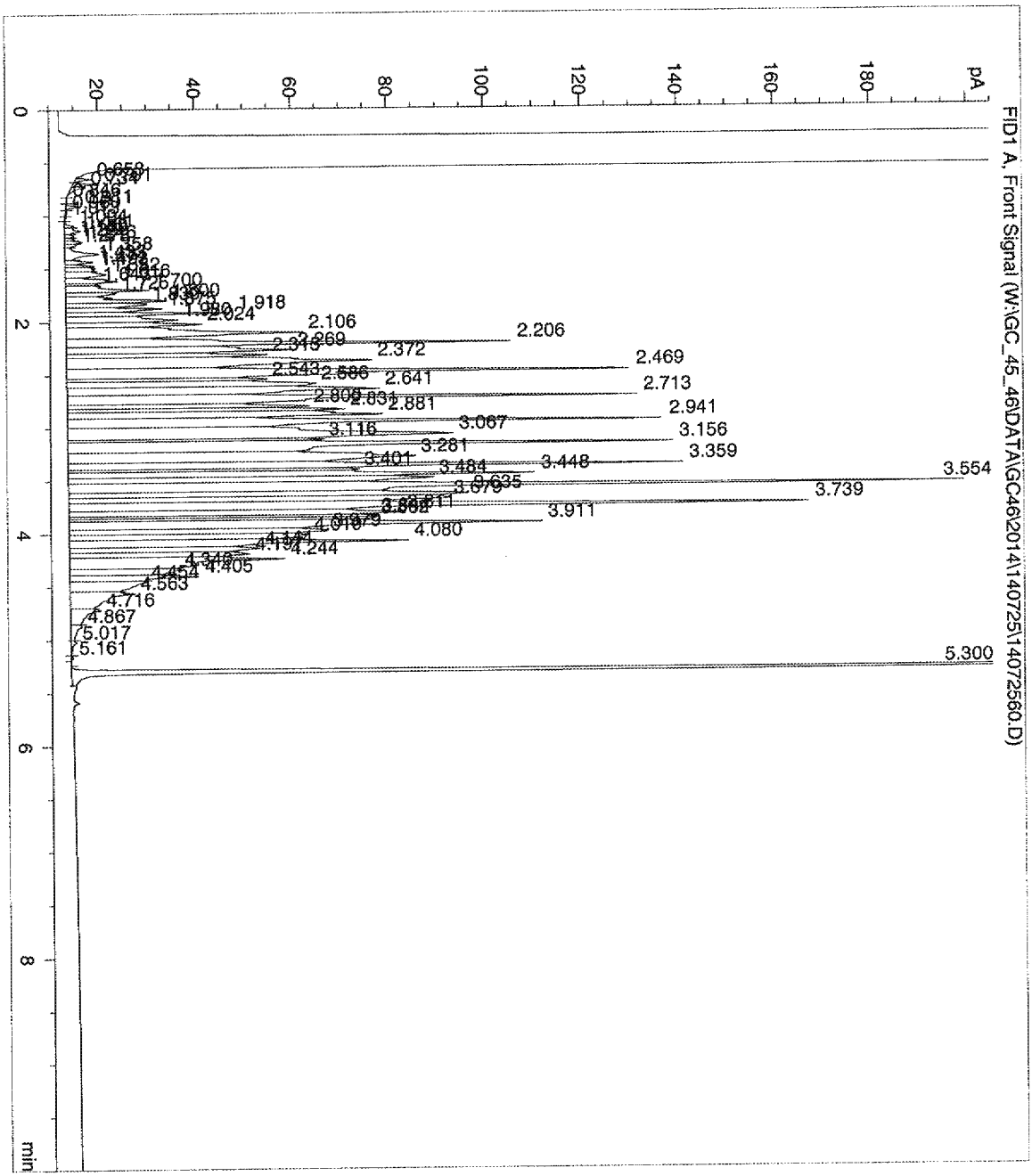

Diesel Standard

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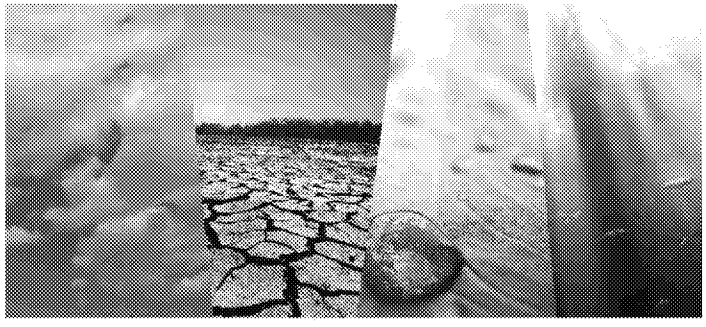
WORK ORDER NUMBER: 14-07-1772

The difference is service



AIR | SOIL | WATER | MARINE CHEMISTRY

Analytical Report For

Client: Environmental Science International, Inc.

Client Project Name: Red Hill LTM 112066

Attention: Robert Chong
354 Uluniu Street, Suite 304
Kailua, HI 96734-2500

Approved for release on 08/01/2014 by:
Richard Villafania
Project Manager

ResultLink ▸

Email your PM ▸

nelac

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Work Order Number: 14-07-1772

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Work Order Narrative

Work Order: 14-07-1772 Page 1 of 1

Condition Upon Receipt:

Samples were received under Chain-of-Custody (COC) on 07/25/14. They were assigned to Work Order 14-07-1772.

Unless otherwise noted on the Sample Receiving forms all samples were received in good condition and within the recommended EPA temperature criteria for the methods noted on the COC. The COC and Sample Receiving Documents are integral elements of the analytical report and are presented at the back of the report.

Holding Times:

All samples were analyzed within prescribed holding times (HT) and/or in accordance with the Calscience Sample Acceptance Policy unless otherwise noted in the analytical report and/or comprehensive case narrative, if required.

Any parameter identified in 40CFR Part 136.3 Table II that is designated as "analyze immediately" with a holding time of <= 15 minutes (40CFR-136.3 Table II, footnote 4), is considered a "field" test and the reported results will be qualified as being received outside of the stated holding time unless received at the laboratory within 15 minutes of the collection time.

Quality Control:

All quality control parameters (QC) were within established control limits except where noted in the QC summary forms or described further within this report.

Additional Comments:

Air - Sorbent-extracted air methods (EPA TO-4A, EPA TO-10, EPA TO-13A, EPA TO-17): Analytical results are converted from mass/sample basis to mass/volume basis using client-supplied air volumes.

New York NELAP air certification does not certify for all reported methods and analytes, reference the accredited items here: http://www.calscience.com/PDF/New_York.pdf

Solid - Unless otherwise indicated, solid sample data is reported on a wet weight basis, not corrected for % moisture. All QC results are always reported on a wet weight basis.

Comment - For EPA Method 8260B, the Acetone MS/MSD and LCS recoveries were above the control limits, any reported concentrations for this analyte may be bias high.

Subcontractor Information:

Unless otherwise noted below (or on the subcontract form), no samples were subcontracted.

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Analytical Report

Environmental Science International, Inc.		Date Received:	07/25/14
354 Uluniu Street, Suite 304		Work Order:	14-07-1772
Kailua, HI 96734-2500		Preparation:	EPA 3510C
		Method:	EPA 8015B (M)
		Units:	ug/L
Project: Red Hill LTM 112066			Page 1 of 1

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
ES109	**14-07-1772-2-H**	**07/24/14 09:00**	**Aqueous**	**GC 46**	**07/28/14**	**07/30/14 01:15**	**140728B13**

Comment(s): - Results were evaluated to the MDL (DL), concentrations >= to the MDL (DL) but < RL (LOQ), if found, are qualified with a "J" flag.

Parameter	Result	DL	LOD	LOQ	DF	Qualifiers
TPH as Diesel	17	12	13	26	1.00	HD,J

Surrogate	Rec. (%)	Control Limits	Qualifiers
n-Octacosane	98	51-141	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
ES110	**14-07-1772-3-H**	**07/24/14 10:00**	**Aqueous**	**GC 46**	**07/28/14**	**07/30/14 01:32**	**140728B13**

Comment(s): - Results were evaluated to the MDL (DL), concentrations >= to the MDL (DL) but < RL (LOQ), if found, are qualified with a "J" flag.

Parameter	Result	DL	LOD	LOQ	DF	Qualifiers
TPH as Diesel	15	11	12	25	1.00	HD,J

Surrogate	Rec. (%)	Control Limits	Qualifiers
n-Octacosane	94	51-141	

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
Method Blank	**099-15-516-162**	**N/A**	**Aqueous**	**GC 46**	**07/28/14**	**07/29/14 23:50**	**140728B13**

Comment(s): - Results were evaluated to the MDL (DL), concentrations >= to the MDL (DL) but < RL (LOQ), if found, are qualified with a "J" flag.

Parameter	Result	DL	LOD	LOQ	DF	Qualifiers
TPH as Diesel	<12	11	12	25	1.00	U

Surrogate	Rec. (%)	Control Limits	Qualifiers
n-Octacosane	88	51-141	

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Analytical Report

Environmental Science International, Inc.		Date Received:	07/25/14
354 Uluniu Street, Suite 304		Work Order:	14-07-1772
Kailua, HI 96734-2500		Preparation:	EPA 3005A Filt.
		Method:	EPA 6020
		Units:	ug/L
Project: Red Hill LTM 112066			Page 1 of 1

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
ES109	**14-07-1772-2-P**	**07/24/14 09:00**	**Aqueous**	**ICP/MS 03**	**07/29/14**	**07/29/14 22:42**	**140729L02D**

Comment(s): - Results were evaluated to the MDL (DL), concentrations >= to the MDL (DL) but < RL (LOQ), if found, are qualified with a "J" flag.

Parameter	Result	DL	LOD	LOQ	DF	Qualifiers
Lead	<0.200	0.0898	0.200	1.00	1.00	U

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
ES110	**14-07-1772-3-G**	**07/24/14 10:00**	**Aqueous**	**ICP/MS 03**	**07/29/14**	**07/29/14 22:46**	**140729L02D**

Comment(s): - Results were evaluated to the MDL (DL), concentrations >= to the MDL (DL) but < RL (LOQ), if found, are qualified with a "J" flag.

Parameter	Result	DL	LOD	LOQ	DF	Qualifiers
Lead	<0.200	0.0898	0.200	1.00	1.00	U

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
Method Blank	**099-14-497-89**	**N/A**	**Aqueous**	**ICP/MS 03**	**07/29/14**	**07/29/14 22:20**	**140729L02D**

Comment(s): - Results were evaluated to the MDL (DL), concentrations >= to the MDL (DL) but < RL (LOQ), if found, are qualified with a "J" flag.

Parameter	Result	DL	LOD	LOQ	DF	Qualifiers
Lead	<0.200	0.0898	0.200	1.00	1.00	U

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Analytical Report

Environmental Science International, Inc.
354 Uluniu Street, Suite 304
Kailua, HI 96734-2500

Date Received: 07/25/14
Work Order: 14-07-1772
Preparation: EPA 3510C
Method: EPA 8270C SIM PAHs
Units: ug/L

Project: Red Hill LTM 112066

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
ES109	**14-07-1772-2-I**	**07/24/14 09:00**	**Aqueous**	**GC/MS AAA**	**07/28/14**	**07/29/14 15:28**	**140728L01**

Comment(s): - Results were evaluated to the MDL (DL), concentrations >= to the MDL (DL) but < RL (LOQ), if found, are qualified with a "J" flag.

Parameter	Result	DL	LOD	LOQ	DF	Qualifiers
Naphthalene	0.031	0.023	0.051	0.20	1.00	J
2-Methylnaphthalene	<0.051	0.027	0.051	0.20	1.00	U
1-Methylnaphthalene	<0.051	0.029	0.051	0.20	1.00	U
Acenaphthylene	<0.051	0.018	0.051	0.20	1.00	U
Acenaphthene	<0.051	0.021	0.051	0.20	1.00	U
Fluorene	<0.051	0.025	0.051	0.20	1.00	U
Phenanthrene	<0.051	0.031	0.051	0.20	1.00	U
Anthracene	<0.051	0.035	0.051	0.20	1.00	U
Fluoranthene	<0.051	0.028	0.051	0.20	1.00	U
Pyrene	<0.051	0.025	0.051	0.20	1.00	U
Benzo (a) Anthracene	<0.051	0.024	0.051	0.20	1.00	U
Chrysene	<0.051	0.019	0.051	0.20	1.00	U
Benzo (k) Fluoranthene	<0.051	0.024	0.051	0.20	1.00	U
Benzo (b) Fluoranthene	<0.051	0.025	0.051	0.20	1.00	U
Benzo (a) Pyrene	<0.051	0.037	0.051	0.20	1.00	U
Indeno (1,2,3-c,d) Pyrene	<0.051	0.022	0.051	0.20	1.00	U
Dibenz (a,h) Anthracene	<0.051	0.027	0.051	0.20	1.00	U
Benzo (g,h,i) Perylene	<0.051	0.022	0.051	0.20	1.00	U

Surrogate	Rec. (%)	Control Limits	Qualifiers
Nitrobenzene-d5	79	28-139	
2-Fluorobiphenyl	77	33-144	
p-Terphenyl-d14	62	23-160	

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Analytical Report

Environmental Science International, Inc.		Date Received:	07/25/14
354 Uluniu Street, Suite 304		Work Order:	14-07-1772
Kailua, HI 96734-2500		Preparation:	EPA 3510C
		Method:	EPA 8270C SIM PAHs
		Units:	ug/L
Project: Red Hill LTM 112066			Page 2 of 3

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
ES110	**14-07-1772-3-J**	**07/24/14 10:00**	**Aqueous**	**GC/MS AAA**	**07/28/14**	**07/29/14 15:53**	**140728L01**

Comment(s): - Results were evaluated to the MDL (DL), concentrations >= to the MDL (DL) but < RL (LOQ), if found, are qualified with a "J" flag.

Parameter	Result	DL	LOD	LOQ	DF	Qualifiers
Naphthalene	0.027	0.023	0.050	0.20	1.00	J
2-Methylnaphthalene	<0.050	0.027	0.050	0.20	1.00	U
1-Methylnaphthalene	<0.050	0.028	0.050	0.20	1.00	U
Acenaphthylene	<0.050	0.018	0.050	0.20	1.00	U
Acenaphthene	<0.050	0.021	0.050	0.20	1.00	U
Fluorene	<0.050	0.024	0.050	0.20	1.00	U
Phenanthrene	<0.050	0.031	0.050	0.20	1.00	U
Anthracene	<0.050	0.034	0.050	0.20	1.00	U
Fluoranthene	<0.050	0.027	0.050	0.20	1.00	U
Pyrene	<0.050	0.025	0.050	0.20	1.00	U
Benzo (a) Anthracene	<0.050	0.024	0.050	0.20	1.00	U
Chrysene	<0.050	0.019	0.050	0.20	1.00	U
Benzo (k) Fluoranthene	<0.050	0.023	0.050	0.20	1.00	U
Benzo (b) Fluoranthene	<0.050	0.025	0.050	0.20	1.00	U
Benzo (a) Pyrene	<0.050	0.036	0.050	0.20	1.00	U
Indeno (1,2,3-c,d) Pyrene	<0.050	0.022	0.050	0.20	1.00	U
Dibenz (a,h) Anthracene	<0.050	0.027	0.050	0.20	1.00	U
Benzo (g,h,i) Perylene	<0.050	0.022	0.050	0.20	1.00	U

Surrogate	Rec. (%)	Control Limits	Qualifiers
Nitrobenzene-d5	74	28-139	
2-Fluorobiphenyl	75	33-144	
p-Terphenyl-d14	61	23-160	

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Analytical Report

Environmental Science International, Inc.		Date Received:	07/25/14
354 Uluniu Street, Suite 304		Work Order:	14-07-1772
Kailua, HI 96734-2500		Preparation:	EPA 3510C
		Method:	EPA 8270C SIM PAHs
		Units:	ug/L
Project: Red Hill LTM 112066			Page 3 of 3

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
Method Blank	**099-15-148-52**	**N/A**	**Aqueous**	**GC/MS AAA**	**07/28/14**	**07/29/14 13:03**	**140728L01**

Comment(s): - Results were evaluated to the MDL (DL), concentrations >= to the MDL (DL) but < RL (LOQ), if found, are qualified with a "J" flag.

Parameter	Result	DL	LOD	LOQ	DF	Qualifiers
Naphthalene	<0.050	0.023	0.050	0.20	1.00	U
2-Methylnaphthalene	<0.050	0.026	0.050	0.20	1.00	U
1-Methylnaphthalene	<0.050	0.028	0.050	0.20	1.00	U
Acenaphthylene	<0.050	0.018	0.050	0.20	1.00	U
Acenaphthene	<0.050	0.021	0.050	0.20	1.00	U
Fluorene	<0.050	0.024	0.050	0.20	1.00	U
Phenanthrene	<0.050	0.031	0.050	0.20	1.00	U
Anthracene	<0.050	0.034	0.050	0.20	1.00	U
Fluoranthene	<0.050	0.027	0.050	0.20	1.00	U
Pyrene	<0.050	0.025	0.050	0.20	1.00	U
Benzo (a) Anthracene	<0.050	0.024	0.050	0.20	1.00	U
Chrysene	<0.050	0.019	0.050	0.20	1.00	U
Benzo (k) Fluoranthene	<0.050	0.023	0.050	0.20	1.00	U
Benzo (b) Fluoranthene	<0.050	0.025	0.050	0.20	1.00	U
Benzo (a) Pyrene	<0.050	0.036	0.050	0.20	1.00	U
Indeno (1,2,3-c,d) Pyrene	<0.050	0.022	0.050	0.20	1.00	U
Dibenz (a,h) Anthracene	<0.050	0.027	0.050	0.20	1.00	U
Benzo (g,h,i) Perylene	<0.050	0.022	0.050	0.20	1.00	U

Surrogate	Rec. (%)	Control Limits	Qualifiers
Nitrobenzene-d5	90	28-139	
2-Fluorobiphenyl	86	33-144	
p-Terphenyl-d14	87	23-160	

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Analytical Report

Environmental Science International, Inc.		Date Received:	07/25/14
354 Uluniu Street, Suite 304		Work Order:	14-07-1772
Kailua, HI 96734-2500		Preparation:	EPA 5030C
		Method:	GC/MS / EPA 8260B
		Units:	ug/L
Project: Red Hill LTM 112066			Page 1 of 8

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
ES TRIP	**14-07-1772-1-A**	**07/24/14 08:00**	**Aqueous**	**GC/MS OO**	**07/29/14**	**07/29/14 21:26**	**140729L022**

Comment(s): - Results were evaluated to the MDL (DL), concentrations >= to the MDL (DL) but < RL (LOQ), if found, are qualified with a "J" flag.

Parameter	Result	DL	LOD	LOQ	DF	Qualifiers
Acetone	<10	6.0	10	20	1.00	U,IH,ICH
Benzene	<0.50	0.14	0.50	1.0	1.00	U
Bromodichloromethane	<0.50	0.21	0.50	5.0	1.00	U
Bromoform	<1.0	0.50	1.0	10	1.00	U
Bromomethane	<5.0	3.9	5.0	20	1.00	U
2-Butanone	<5.0	2.2	5.0	10	1.00	U
Carbon Tetrachloride	<0.50	0.23	0.50	1.0	1.00	U
Chlorobenzene	<0.50	0.17	0.50	5.0	1.00	U
Chloroethane	<5.0	2.3	5.0	10	1.00	U
Chloroform	<0.50	0.46	0.50	5.0	1.00	U
Chloromethane	<2.0	1.8	2.0	10	1.00	U
Dibromochloromethane	<0.50	0.25	0.50	1.0	1.00	U
1,2-Dibromo-3-Chloropropane	<2.0	1.2	2.0	10	1.00	U
1,2-Dibromoethane	<0.50	0.36	0.50	1.0	1.00	U
1,2-Dichlorobenzene	<0.50	0.46	0.50	1.0	1.00	U
1,3-Dichlorobenzene	<0.50	0.40	0.50	1.0	1.00	U
1,4-Dichlorobenzene	<0.50	0.43	0.50	1.0	1.00	U
1,1-Dichloroethane	<0.50	0.28	0.50	5.0	1.00	U
1,2-Dichloroethane	<0.50	0.24	0.50	1.0	1.00	U
1,1-Dichloroethene	<0.50	0.43	0.50	1.0	1.00	U
c-1,2-Dichloroethene	<0.50	0.48	0.50	1.0	1.00	U
t-1,2-Dichloroethene	<0.50	0.37	0.50	1.0	1.00	U
1,2-Dichloropropane	<0.50	0.42	0.50	5.0	1.00	U
c-1,3-Dichloropropene	<0.50	0.25	0.50	1.0	1.00	U
t-1,3-Dichloropropene	<0.50	0.25	0.50	1.0	1.00	U
Ethylbenzene	<0.50	0.14	0.50	1.0	1.00	U
Methylene Chloride	<1.0	0.64	1.0	5.0	1.00	U
4-Methyl-2-Pentanone	<5.0	4.4	5.0	10	1.00	U
Styrene	<0.50	0.17	0.50	1.0	1.00	U
1,1,1,2-Tetrachloroethane	<0.50	0.40	0.50	1.0	1.00	U
1,1,2,2-Tetrachloroethane	<0.50	0.41	0.50	1.0	1.00	U
Tetrachloroethene	<0.50	0.39	0.50	5.0	1.00	U
Toluene	<0.50	0.24	0.50	1.0	1.00	U
1,2,4-Trichlorobenzene	<1.0	0.50	1.0	5.0	1.00	U
1,1,1-Trichloroethane	<0.50	0.30	0.50	5.0	1.00	U
Hexachloro-1,3-Butadiene	<0.50	0.32	0.50	1.0	1.00	U

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Analytical Report

Environmental Science International, Inc.	Date Received:	07/25/14
354 Uluniu Street, Suite 304	Work Order:	14-07-1772
Kailua, HI 96734-2500	Preparation:	EPA 5030C
	Method:	GC/MS / EPA 8260B
	Units:	ug/L
Project: Red Hill LTM 112066		Page 2 of 8

Parameter	Result	DL	LOD	LOQ	DF	Qualifiers
1,1,2-Trichloroethane	<0.50	0.38	0.50	1.0	1.00	U
Trichloroethene	<0.50	0.37	0.50	1.0	1.00	U
1,2,3-Trichloropropane	<1.0	0.64	1.0	5.0	1.00	U
Vinyl Chloride	<0.50	0.30	0.50	1.0	1.00	U
p/m-Xylene	<1.0	0.30	1.0	10	1.00	U
o-Xylene	<0.50	0.23	0.50	1.0	1.00	U
Methyl-t-Butyl Ether (MTBE)	<0.50	0.31	0.50	1.0	1.00	U
Gasoline Range Organics	<30	26	30	50	1.00	U

Surrogate	Rec. (%)	Control Limits	Qualifiers
Dibromofluoromethane	102	80-126	
1,2-Dichloroethane-d4	100	80-134	
Toluene-d8	100	80-120	
Toluene-d8-TPPH	100	88-112	
1,4-Bromofluorobenzene	95	80-120	

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Analytical Report

Environmental Science International, Inc.		Date Received:	07/25/14
354 Uluniu Street, Suite 304		Work Order:	14-07-1772
Kailua, HI 96734-2500		Preparation:	EPA 5030C
		Method:	GC/MS / EPA 8260B
		Units:	ug/L
Project: Red Hill LTM 112066			Page 3 of 8

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
ES109	**14-07-1772-2-A**	**07/24/14 09:00**	**Aqueous**	**GC/MS OO**	**07/29/14**	**07/29/14 19:10**	**140729L022**

Comment(s): - Results were evaluated to the MDL (DL), concentrations >= to the MDL (DL) but < RL (LOQ), if found, are qualified with a "J" flag.

Parameter	Result	DL	LOD	LOQ	DF	Qualifiers
Acetone	6.4	6.0	10	20	1.00	J,IH,ICH
Benzene	<0.50	0.14	0.50	1.0	1.00	U
Bromodichloromethane	<0.50	0.21	0.50	5.0	1.00	U
Bromoform	<1.0	0.50	1.0	10	1.00	U
Bromomethane	<5.0	3.9	5.0	20	1.00	U
2-Butanone	<5.0	2.2	5.0	10	1.00	U
Carbon Tetrachloride	<0.50	0.23	0.50	1.0	1.00	U
Chlorobenzene	<0.50	0.17	0.50	5.0	1.00	U
Chloroethane	<5.0	2.3	5.0	10	1.00	U
Chloroform	<0.50	0.46	0.50	5.0	1.00	U
Chloromethane	<2.0	1.8	2.0	10	1.00	U
Dibromochloromethane	<0.50	0.25	0.50	1.0	1.00	U
1,2-Dibromo-3-Chloropropane	<2.0	1.2	2.0	10	1.00	U
1,2-Dibromoethane	<0.50	0.36	0.50	1.0	1.00	U
1,2-Dichlorobenzene	<0.50	0.46	0.50	1.0	1.00	U
1,3-Dichlorobenzene	<0.50	0.40	0.50	1.0	1.00	U
1,4-Dichlorobenzene	<0.50	0.43	0.50	1.0	1.00	U
1,1-Dichloroethane	<0.50	0.28	0.50	5.0	1.00	U
1,2-Dichloroethane	<0.50	0.24	0.50	1.0	1.00	U
1,1-Dichloroethene	<0.50	0.43	0.50	1.0	1.00	U
c-1,2-Dichloroethene	<0.50	0.48	0.50	1.0	1.00	U
t-1,2-Dichloroethene	<0.50	0.37	0.50	1.0	1.00	U
1,2-Dichloropropane	<0.50	0.42	0.50	5.0	1.00	U
c-1,3-Dichloropropene	<0.50	0.25	0.50	1.0	1.00	U
t-1,3-Dichloropropene	<0.50	0.25	0.50	1.0	1.00	U
Ethylbenzene	<0.50	0.14	0.50	1.0	1.00	U
Methylene Chloride	<1.0	0.64	1.0	5.0	1.00	U
4-Methyl-2-Pentanone	<5.0	4.4	5.0	10	1.00	U
Styrene	<0.50	0.17	0.50	1.0	1.00	U
1,1,1,2-Tetrachloroethane	<0.50	0.40	0.50	1.0	1.00	U
1,1,2,2-Tetrachloroethane	<0.50	0.41	0.50	1.0	1.00	U
Tetrachloroethene	<0.50	0.39	0.50	5.0	1.00	U
Toluene	<0.50	0.24	0.50	1.0	1.00	U
1,2,4-Trichlorobenzene	<1.0	0.50	1.0	5.0	1.00	U
1,1,1-Trichloroethane	<0.50	0.30	0.50	5.0	1.00	U
Hexachloro-1,3-Butadiene	<0.50	0.32	0.50	1.0	1.00	U

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Analytical Report

Environmental Science International, Inc.
354 Uluniu Street, Suite 304
Kailua, HI 96734-2500

Date Received: 07/25/14
Work Order: 14-07-1772
Preparation: EPA 5030C
Method: GC/MS / EPA 8260B
Units: ug/L

Project: Red Hill LTM 112066

Parameter	Result	DL	LOD	LOQ	DF	Qualifiers
1,1,2-Trichloroethane	<0.50	0.38	0.50	1.0	1.00	U
Trichloroethene	<0.50	0.37	0.50	1.0	1.00	U
1,2,3-Trichloropropane	<1.0	0.64	1.0	5.0	1.00	U
Vinyl Chloride	<0.50	0.30	0.50	1.0	1.00	U
p/m-Xylene	<1.0	0.30	1.0	10	1.00	U
o-Xylene	<0.50	0.23	0.50	1.0	1.00	U
Methyl-t-Butyl Ether (MTBE)	<0.50	0.31	0.50	1.0	1.00	U
Gasoline Range Organics	<30	26	30	50	1.00	U

Surrogate	Rec. (%)	Control Limits	Qualifiers
Dibromofluoromethane	84	80-126	
1,2-Dichloroethane-d4	97	80-134	
Toluene-d8	99	80-120	
Toluene-d8-TPPH	98	88-112	
1,4-Bromofluorobenzene	95	80-120	

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Analytical Report

Environmental Science International, Inc.
354 Uluniu Street, Suite 304
Kailua, HI 96734-2500

Date Received: 07/25/14
Work Order: 14-07-1772
Preparation: EPA 5030C
Method: GC/MS / EPA 8260B
Units: ug/L

Project: Red Hill LTM 112066

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
ES110	**14-07-1772-3-A**	**07/24/14 10:00**	**Aqueous**	**GC/MS OO**	**07/29/14**	**07/29/14 22:20**	**140729L022**

Comment(s): - Results were evaluated to the MDL (DL), concentrations >= to the MDL (DL) but < RL (LOQ), if found, are qualified with a "J" flag.

Parameter	Result	DL	LOD	LOQ	DF	Qualifiers
Acetone	9.8	6.0	10	20	1.00	J,IH,ICH
Benzene	<0.50	0.14	0.50	1.0	1.00	U
Bromodichloromethane	<0.50	0.21	0.50	5.0	1.00	U
Bromoform	<1.0	0.50	1.0	10	1.00	U
Bromomethane	<5.0	3.9	5.0	20	1.00	U
2-Butanone	<5.0	2.2	5.0	10	1.00	U
Carbon Tetrachloride	<0.50	0.23	0.50	1.0	1.00	U
Chlorobenzene	<0.50	0.17	0.50	5.0	1.00	U
Chloroethane	<5.0	2.3	5.0	10	1.00	U
Chloroform	<0.50	0.46	0.50	5.0	1.00	U
Chloromethane	<2.0	1.8	2.0	10	1.00	U
Dibromochloromethane	<0.50	0.25	0.50	1.0	1.00	U
1,2-Dibromo-3-Chloropropane	<2.0	1.2	2.0	10	1.00	U
1,2-Dibromoethane	<0.50	0.36	0.50	1.0	1.00	U
1,2-Dichlorobenzene	<0.50	0.46	0.50	1.0	1.00	U
1,3-Dichlorobenzene	<0.50	0.40	0.50	1.0	1.00	U
1,4-Dichlorobenzene	<0.50	0.43	0.50	1.0	1.00	U
1,1-Dichloroethane	<0.50	0.28	0.50	5.0	1.00	U
1,2-Dichloroethane	<0.50	0.24	0.50	1.0	1.00	U
1,1-Dichloroethene	<0.50	0.43	0.50	1.0	1.00	U
c-1,2-Dichloroethene	<0.50	0.48	0.50	1.0	1.00	U
t-1,2-Dichloroethene	<0.50	0.37	0.50	1.0	1.00	U
1,2-Dichloropropane	<0.50	0.42	0.50	5.0	1.00	U
c-1,3-Dichloropropene	<0.50	0.25	0.50	1.0	1.00	U
t-1,3-Dichloropropene	<0.50	0.25	0.50	1.0	1.00	U
Ethylbenzene	<0.50	0.14	0.50	1.0	1.00	U
Methylene Chloride	<1.0	0.64	1.0	5.0	1.00	U
4-Methyl-2-Pentanone	<5.0	4.4	5.0	10	1.00	U
Styrene	<0.50	0.17	0.50	1.0	1.00	U
1,1,1,2-Tetrachloroethane	<0.50	0.40	0.50	1.0	1.00	U
1,1,2,2-Tetrachloroethane	<0.50	0.41	0.50	1.0	1.00	U
Tetrachloroethene	<0.50	0.39	0.50	5.0	1.00	U
Toluene	<0.50	0.24	0.50	1.0	1.00	U
1,2,4-Trichlorobenzene	<1.0	0.50	1.0	5.0	1.00	U
1,1,1-Trichloroethane	<0.50	0.30	0.50	5.0	1.00	U
Hexachloro-1,3-Butadiene	<0.50	0.32	0.50	1.0	1.00	U

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Analytical Report

Environmental Science International, Inc.
354 Uluniu Street, Suite 304
Kailua, HI 96734-2500

Date Received: 07/25/14
Work Order: 14-07-1772
Preparation: EPA 5030C
Method: GC/MS / EPA 8260B
Units: ug/L

Project: Red Hill LTM 112066

Parameter	Result	DL	LOD	LOQ	DF	Qualifiers
1,1,2-Trichloroethane	<0.50	0.38	0.50	1.0	1.00	U
Trichloroethene	<0.50	0.37	0.50	1.0	1.00	U
1,2,3-Trichloropropane	<1.0	0.64	1.0	5.0	1.00	U
Vinyl Chloride	<0.50	0.30	0.50	1.0	1.00	U
p/m-Xylene	<1.0	0.30	1.0	10	1.00	U
o-Xylene	<0.50	0.23	0.50	1.0	1.00	U
Methyl-t-Butyl Ether (MTBE)	<0.50	0.31	0.50	1.0	1.00	U
Gasoline Range Organics	<30	26	30	50	1.00	U

Surrogate	Rec. (%)	Control Limits	Qualifiers
Dibromofluoromethane	89	80-126	
1,2-Dichloroethane-d4	100	80-134	
Toluene-d8	101	80-120	
Toluene-d8-TPPH	101	88-112	
1,4-Bromofluorobenzene	96	80-120	

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Analytical Report

Environmental Science International, Inc.		Date Received:	07/25/14
354 Uluniu Street, Suite 304		Work Order:	14-07-1772
Kailua, HI 96734-2500		Preparation:	EPA 5030C
		Method:	GC/MS / EPA 8260B
		Units:	ug/L
Project: Red Hill LTM 112066			Page 7 of 8

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
Method Blank	**099-13-057-61**	**N/A**	**Aqueous**	**GC/MS OO**	**07/29/14**	**07/29/14 17:50**	**140729L022**

Comment(s): - Results were evaluated to the MDL (DL), concentrations >= to the MDL (DL) but < RL (LOQ), if found, are qualified with a "J" flag.

Parameter	Result	DL	LOD	LOQ	DF	Qualifiers
Acetone	<10	6.0	10	20	1.00	U
Benzene	<0.50	0.14	0.50	1.0	1.00	U
Bromodichloromethane	<0.50	0.21	0.50	5.0	1.00	U
Bromoform	<1.0	0.50	1.0	10	1.00	U
Bromomethane	<5.0	3.9	5.0	20	1.00	U
2-Butanone	<5.0	2.2	5.0	10	1.00	U
Carbon Tetrachloride	<0.50	0.23	0.50	1.0	1.00	U
Chlorobenzene	<0.50	0.17	0.50	5.0	1.00	U
Chloroethane	<5.0	2.3	5.0	10	1.00	U
Chloroform	<0.50	0.46	0.50	5.0	1.00	U
Chloromethane	<2.0	1.8	2.0	10	1.00	U
Dibromochloromethane	<0.50	0.25	0.50	1.0	1.00	U
1,2-Dibromo-3-Chloropropane	<2.0	1.2	2.0	10	1.00	U
1,2-Dibromoethane	<0.50	0.36	0.50	1.0	1.00	U
1,2-Dichlorobenzene	<0.50	0.46	0.50	1.0	1.00	U
1,3-Dichlorobenzene	<0.50	0.40	0.50	1.0	1.00	U
1,4-Dichlorobenzene	<0.50	0.43	0.50	1.0	1.00	U
1,1-Dichloroethane	<0.50	0.28	0.50	5.0	1.00	U
1,2-Dichloroethane	<0.50	0.24	0.50	1.0	1.00	U
1,1-Dichloroethene	<0.50	0.43	0.50	1.0	1.00	U
c-1,2-Dichloroethene	<0.50	0.48	0.50	1.0	1.00	U
t-1,2-Dichloroethene	<0.50	0.37	0.50	1.0	1.00	U
1,2-Dichloropropane	<0.50	0.42	0.50	5.0	1.00	U
c-1,3-Dichloropropene	<0.50	0.25	0.50	1.0	1.00	U
t-1,3-Dichloropropene	<0.50	0.25	0.50	1.0	1.00	U
Ethylbenzene	<0.50	0.14	0.50	1.0	1.00	U
Methylene Chloride	<1.0	0.64	1.0	5.0	1.00	U
4-Methyl-2-Pentanone	<5.0	4.4	5.0	10	1.00	U
Styrene	<0.50	0.17	0.50	1.0	1.00	U
1,1,1,2-Tetrachloroethane	<0.50	0.40	0.50	1.0	1.00	U
1,1,2,2-Tetrachloroethane	<0.50	0.41	0.50	1.0	1.00	U
Tetrachloroethene	<0.50	0.39	0.50	5.0	1.00	U
Toluene	<0.50	0.24	0.50	1.0	1.00	U
1,2,4-Trichlorobenzene	<1.0	0.50	1.0	5.0	1.00	U
1,1,1-Trichloroethane	<0.50	0.30	0.50	5.0	1.00	U
Hexachloro-1,3-Butadiene	<0.50	0.32	0.50	1.0	1.00	U

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Analytical Report

Environmental Science International, Inc.
354 Uluniu Street, Suite 304
Kailua, HI 96734-2500

Date Received: 07/25/14
Work Order: 14-07-1772
Preparation: EPA 5030C
Method: GC/MS / EPA 8260B
Units: ug/L

Project: Red Hill LTM 112066

Parameter	Result	DL	LOD	LOQ	DF	Qualifiers
1,1,2-Trichloroethane	<0.50	0.38	0.50	1.0	1.00	U
Trichloroethene	<0.50	0.37	0.50	1.0	1.00	U
1,2,3-Trichloropropane	<1.0	0.64	1.0	5.0	1.00	U
Vinyl Chloride	<0.50	0.30	0.50	1.0	1.00	U
p/m-Xylene	<1.0	0.30	1.0	10	1.00	U
o-Xylene	<0.50	0.23	0.50	1.0	1.00	U
Methyl-t-Butyl Ether (MTBE)	<0.50	0.31	0.50	1.0	1.00	U
Gasoline Range Organics	<30	26	30	50	1.00	U

Surrogate	Rec. (%)	Control Limits	Qualifiers
Dibromofluoromethane	98	80-126	
1,2-Dichloroethane-d4	94	80-134	
Toluene-d8	99	80-120	
Toluene-d8-TPPH	98	88-112	
1,4-Bromofluorobenzene	94	80-120	

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Quality Control - Spike/Spike Duplicate

Environmental Science International, Inc.	Date Received: 07/25/14
354 Uluniu Street, Suite 304	Work Order: 14-07-1772
Kailua, HI 96734-2500	Preparation: EPA 3510C
	Method: EPA 8015B (M)
Project: Red Hill LTM 112066	Page 1 of 5

Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	MS/MSD Batch Number
ES109	**Sample**	**Aqueous**	**GC 46**	**07/28/14**	**07/30/14 01:15**	**140728S13**
ES109	**Matrix Spike**	**Aqueous**	**GC 46**	**07/28/14**	**07/30/14 00:41**	**140728S13**
ES109	**Matrix Spike Duplicate**	**Aqueous**	**GC 46**	**07/28/14**	**07/30/14 00:58**	**140728S13**

Parameter	Sample Conc.	Spike Added	MS Conc.	MS %Rec.	MSD Conc.	MSD %Rec.	%Rec. CL	RPD	RPD CL	Qualifiers
TPH as Diesel	ND	4000	4029	101	4146	104	55-133	3	0-30	

RPD: Relative Percent Difference. CL: Control Limits

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Quality Control - Spike/Spike Duplicate

Environmental Science International, Inc.	Date Received:	07/25/14
354 Uluniu Street, Suite 304	Work Order:	14-07-1772
Kailua, HI 96734-2500	Preparation:	EPA 3005A Filt.
	Method:	EPA 6020
Project: Red Hill LTM 112066		Page 2 of 5

Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	MS/MSD Batch Number
ES109	**Sample**	**Aqueous**	**ICP/MS 03**	**07/29/14**	**07/29/14 22:42**	**140729S02**
ES109	**Matrix Spike**	**Aqueous**	**ICP/MS 03**	**07/29/14**	**07/29/14 22:26**	**140729S02**
ES109	**Matrix Spike Duplicate**	**Aqueous**	**ICP/MS 03**	**07/29/14**	**07/29/14 22:29**	**140729S02**

Parameter	Sample Conc.	Spike Added	MS Conc.	MS %Rec.	MSD Conc.	MSD %Rec.	%Rec. CL	RPD	RPD CL	Qualifiers
Lead	ND	100.0	100.7	101	106.5	107	80-120	6	0-20	

RPD: Relative Percent Difference. CL: Control Limits

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Quality Control - Spike/Spike Duplicate

Environmental Science International, Inc.		Date Received:	07/25/14
354 Uluniu Street, Suite 304		Work Order:	14-07-1772
Kailua, HI 96734-2500		Preparation:	EPA 3510C
		Method:	EPA 8270C SIM PAHs
Project: Red Hill LTM 112066			Page 3 of 5

Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	MS/MSD Batch Number
ES109	**Sample**	**Aqueous**	**GC/MS AAA**	**07/28/14**	**07/29/14 15:28**	**140728S01A**
ES109	**Matrix Spike**	**Aqueous**	**GC/MS AAA**	**07/28/14**	**07/29/14 14:40**	**140728S01A**
ES109	**Matrix Spike Duplicate**	**Aqueous**	**GC/MS AAA**	**07/28/14**	**07/29/14 15:04**	**140728S01A**

Parameter	Sample Conc.	Spike Added	MS Conc.	MS %Rec.	MSD Conc.	MSD %Rec.	%Rec. CL	RPD	RPD CL	Qualifiers
Naphthalene	ND	2.000	1.544	77	1.541	77	21-133	0	0-25	
2-Methylnaphthalene	ND	2.000	1.486	74	1.484	74	21-140	0	0-25	
1-Methylnaphthalene	ND	2.000	1.446	72	1.451	73	20-140	0	0-25	
Acenaphthylene	ND	2.000	1.480	74	1.442	72	33-145	3	0-25	
Acenaphthene	ND	2.000	1.560	78	1.536	77	49-121	2	0-25	
Fluorene	ND	2.000	1.596	80	1.532	77	59-121	4	0-25	
Phenanthrene	ND	2.000	1.501	75	1.455	73	54-120	3	0-25	
Anthracene	ND	2.000	1.524	76	1.333	67	27-133	13	0-25	
Fluoranthene	ND	2.000	1.500	75	1.423	71	26-137	5	0-25	
Pyrene	ND	2.000	1.459	73	1.385	69	18-168	5	0-25	
Benzo (a) Anthracene	ND	2.000	1.437	72	1.313	66	33-143	9	0-25	
Chrysene	ND	2.000	1.529	76	1.414	71	17-168	8	0-25	
Benzo (k) Fluoranthene	ND	2.000	1.390	70	1.309	65	24-159	6	0-25	
Benzo (b) Fluoranthene	ND	2.000	1.336	67	1.229	61	24-159	8	0-25	
Benzo (a) Pyrene	ND	2.000	1.337	67	1.184	59	17-163	12	0-25	
Indeno (1,2,3-c,d) Pyrene	ND	2.000	1.506	75	1.449	72	10-171	4	0-25	
Dibenz (a,h) Anthracene	ND	2.000	1.500	75	1.462	73	10-219	3	0-25	
Benzo (g,h,i) Perylene	ND	2.000	1.556	78	1.517	76	10-227	3	0-25	

RPD: Relative Percent Difference. CL: Control Limits

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Quality Control - Spike/Spike Duplicate

Environmental Science International, Inc.		Date Received:	07/25/14
354 Uluniu Street, Suite 304		Work Order:	14-07-1772
Kailua, HI 96734-2500		Preparation:	EPA 5030C
		Method:	GC/MS / EPA 8260B
Project: Red Hill LTM 112066			Page 4 of 5

Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	MS/MSD Batch Number
ES109	Sample	Aqueous	GC/MS OO	07/29/14	07/29/14 19:10	140729S008
ES109	Matrix Spike	Aqueous	GC/MS OO	07/29/14	07/29/14 19:37	140729S008
ES109	Matrix Spike Duplicate	Aqueous	GC/MS OO	07/29/14	07/29/14 20:04	140729S008

Parameter	Sample Conc.	Spike Added	MS Conc.	MS %Rec.	MSD Conc.	MSD %Rec.	%Rec. CL	RPD	RPD CL	Qualifiers
Acetone	ND	50.00	101.0	202	121.2	242	40-140	18	0-20	3
Benzene	ND	50.00	51.02	102	51.39	103	80-120	1	0-20	
Bromodichloromethane	ND	50.00	52.03	104	52.88	106	75-120	2	0-20	
Bromoform	ND	50.00	50.47	101	49.22	98	70-130	3	0-20	
Bromomethane	ND	50.00	46.62	93	46.60	93	30-145	0	0-20	
2-Butanone	ND	50.00	63.95	128	71.26	143	30-150	11	0-20	
Carbon Tetrachloride	ND	50.00	49.41	99	50.40	101	65-140	2	0-20	
Chlorobenzene	ND	50.00	51.45	103	51.05	102	80-120	1	0-20	
Chloroethane	ND	50.00	42.30	85	43.29	87	60-135	2	0-20	
Chloroform	ND	50.00	49.58	99	51.41	103	65-135	4	0-20	
Chloromethane	ND	50.00	40.81	82	41.12	82	40-125	1	0-20	
Dibromochloromethane	ND	50.00	53.16	106	52.64	105	60-135	1	0-20	
1,2-Dibromo-3-Chloropropane	ND	50.00	40.92	82	40.81	82	50-130	0	0-20	
1,2-Dibromoethane	ND	50.00	49.63	99	50.38	101	80-120	1	0-20	
1,2-Dichlorobenzene	ND	50.00	50.40	101	50.33	101	70-120	0	0-20	
1,3-Dichlorobenzene	ND	50.00	50.49	101	50.47	101	75-125	0	0-20	
1,4-Dichlorobenzene	ND	50.00	48.20	96	47.65	95	75-125	1	0-20	
1,1-Dichloroethane	ND	50.00	48.07	96	49.29	99	70-135	3	0-20	
1,2-Dichloroethane	ND	50.00	51.10	102	51.62	103	70-130	1	0-20	
1,1-Dichloroethene	ND	50.00	52.31	105	54.71	109	70-130	4	0-20	
c-1,2-Dichloroethene	ND	50.00	53.56	107	56.59	113	70-125	5	0-20	
t-1,2-Dichloroethene	ND	50.00	53.58	107	54.38	109	60-140	1	0-20	
1,2-Dichloropropane	ND	50.00	51.07	102	52.26	105	75-125	2	0-20	
c-1,3-Dichloropropene	ND	50.00	54.04	108	54.42	109	70-130	1	0-20	
t-1,3-Dichloropropene	ND	50.00	52.76	106	51.99	104	55-140	1	0-20	
Ethylbenzene	ND	50.00	49.64	99	49.90	100	75-125	1	0-20	
Methylene Chloride	ND	50.00	54.47	109	55.07	110	55-140	1	0-20	
4-Methyl-2-Pentanone	ND	50.00	51.24	102	53.16	106	60-135	4	0-20	
Styrene	ND	50.00	51.61	103	51.40	103	65-135	0	0-20	
1,1,1,2-Tetrachloroethane	ND	50.00	48.47	97	48.27	97	80-130	0	0-20	
1,1,2,2-Tetrachloroethane	ND	50.00	1.110	2	1.025	2	65-130	8	0-20	3
Tetrachloroethene	ND	50.00	61.10	122	59.87	120	45-150	2	0-20	
Toluene	ND	50.00	51.07	102	51.34	103	75-120	1	0-20	
1,2,4-Trichlorobenzene	ND	50.00	49.69	99	48.25	96	65-135	3	0-20	
1,1,1-Trichloroethane	ND	50.00	48.75	97	49.79	100	65-130	2	0-20	

RPD: Relative Percent Difference. CL: Control Limits

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Quality Control - Spike/Spike Duplicate

Environmental Science International, Inc.	Date Received:	07/25/14
354 Uluniu Street, Suite 304	Work Order:	14-07-1772
Kailua, HI 96734-2500	Preparation:	EPA 5030C
	Method:	GC/MS / EPA 8260B
Project: Red Hill LTM 112066		Page 5 of 5

Parameter	Sample Conc.	Spike Added	MS Conc.	MS %Rec.	MSD Conc.	MSD %Rec.	%Rec. CL	RPD	RPD CL	Qualifiers
Hexachloro-1,3-Butadiene	ND	50.00	45.93	92	45.20	90	50-140	2	0-20	
1,1,2-Trichloroethane	ND	50.00	48.27	97	47.83	96	75-125	1	0-20	
Trichloroethene	ND	50.00	88.44	177	88.65	177	70-125	0	0-20	3
1,2,3-Trichloropropane	ND	50.00	48.13	96	47.94	96	75-125	0	0-20	
Vinyl Chloride	ND	50.00	42.89	86	43.32	87	50-145	1	0-20	
p/m-Xylene	ND	100.0	99.92	100	99.91	100	75-130	0	0-20	
o-Xylene	ND	50.00	52.69	105	52.29	105	80-120	1	0-20	
Methyl-t-Butyl Ether (MTBE)	ND	50.00	49.61	99	51.18	102	65-125	3	0-20	

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RPD: Relative Percent Difference. CL: Control Limits

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Quality Control - PDS

Environmental Science International, Inc.		Date Received:	07/25/14
354 Uluniu Street, Suite 304		Work Order:	14-07-1772
Kailua, HI 96734-2500		Preparation:	EPA 3005A Filt.
		Method:	EPA 6020
Project: Red Hill LTM 112066			Page 1 of 1

Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	PDS/PDSD Batch Number
ES109	**Sample**	**Aqueous**	**ICP/MS 03**	**07/29/14 00:00**	**07/29/14 22:42**	**140729S02**
ES109	**PDS**	**Aqueous**	**ICP/MS 03**	**07/29/14 00:00**	**07/29/14 22:33**	**140729S02**

Parameter	Sample Conc.	Spike Added	PDS Conc.	PDS %Rec.	%Rec. CL	Qualifiers
Lead	ND	100.0	102.5	103	75-125	

RPD: Relative Percent Difference. CL: Control Limits

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Quality Control - LCS/LCSD

Environmental Science International, Inc.	Date Received: 07/25/14
354 Uluniu Street, Suite 304	Work Order: 14-07-1772
Kailua, HI 96734-2500	Preparation: EPA 3510C
	Method: EPA 8015B (M)
Project: Red Hill LTM 112066	Page 1 of 5

Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	LCS/LCSD Batch Number
099-15-516-162	**LCS**	**Aqueous**	**GC 46**	**07/28/14**	**07/30/14 00:07**	**140728B13**
099-15-516-162	**LCSD**	**Aqueous**	**GC 46**	**07/28/14**	**07/30/14 00:24**	**140728B13**

Parameter	Spike Added	LCS Conc.	LCS %Rec.	LCSD Conc.	LCSD %Rec.	%Rec. CL	RPD	RPD CL	Qualifiers
TPH as Diesel	2000	1887	94	1832	92	60-132	3	0-11	

RPD: Relative Percent Difference. CL: Control Limits

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Quality Control - LCS

Environmental Science International, Inc.		Date Received:	07/25/14
354 Uluniu Street, Suite 304		Work Order:	14-07-1772
Kailua, HI 96734-2500		Preparation:	EPA 3005A Filt.
		Method:	EPA 6020
Project: Red Hill LTM 112066			Page 2 of 5

Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	LCS Batch Number
099-14-497-89	**LCS**	**Aqueous**	**ICP/MS 03**	**07/29/14**	**07/29/14 22:23**	**140729L02D**

Parameter	Spike Added	Conc. Recovered	LCS %Rec.	%Rec. CL	Qualifiers
Lead	100.0	96.78	97	80-120	

RPD: Relative Percent Difference. CL: Control Limits

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Quality Control - LCS

Environmental Science International, Inc.		Date Received:	07/25/14
354 Uluniu Street, Suite 304		Work Order:	14-07-1772
Kailua, HI 96734-2500		Preparation:	EPA 3510C
		Method:	EPA 8270C SIM PAHs
Project: Red Hill LTM 112066			Page 3 of 5

Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	LCS Batch Number
099-15-148-52	LCS	Aqueous	GC/MS AAA	07/28/14	07/29/14 13:28	140728L01

Parameter	Spike Added	Conc. Recovered	LCS %Rec.	%Rec. CL	Qualifiers
Naphthalene	2.000	1.361	68	21-133	
2-Methylnaphthalene	2.000	1.230	61	21-140	
1-Methylnaphthalene	2.000	1.226	61	20-140	
Acenaphthylene	2.000	1.167	58	33-145	
Acenaphthene	2.000	1.271	64	55-121	
Fluorene	2.000	1.315	66	59-121	
Phenanthrene	2.000	1.379	69	54-120	
Anthracene	2.000	1.393	70	27-133	
Fluoranthene	2.000	1.385	69	26-137	
Pyrene	2.000	1.333	67	45-129	
Benzo (a) Anthracene	2.000	1.343	67	33-143	
Chrysene	2.000	1.447	72	17-168	
Benzo (k) Fluoranthene	2.000	1.265	63	24-159	
Benzo (b) Fluoranthene	2.000	1.294	65	24-159	
Benzo (a) Pyrene	2.000	1.273	64	17-163	
Indeno (1,2,3-c,d) Pyrene	2.000	1.408	70	25-175	
Dibenz (a,h) Anthracene	2.000	1.350	67	25-175	
Benzo (g,h,i) Perylene	2.000	1.500	75	25-157	

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RPD: Relative Percent Difference. CL: Control Limits

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Quality Control - LCS/LCSD

Environmental Science International, Inc.		Date Received:	07/25/14
354 Uluniu Street, Suite 304		Work Order:	14-07-1772
Kailua, HI 96734-2500		Preparation:	EPA 5030C
		Method:	GC/MS / EPA 8260B
Project: Red Hill LTM 112066			Page 4 of 5

Quality Control Sample ID	Type	Matrix	Instrument	Date Prepared	Date Analyzed	LCS/LCSD Batch Number
099-13-057-61	LCS	Aqueous	GC/MS OO	07/29/14	07/29/14 16:10	140729L022
099-13-057-61	LCSD	Aqueous	GC/MS OO	07/29/14	07/29/14 16:37	140729L022

Parameter	Spike Added	LCS Conc.	LCS %Rec.	LCSD Conc.	LCSD %Rec.	%Rec. CL	RPD	RPD CL	Qualifiers
Acetone	50.00	96.52	193	N/A	N/A	40-140	N/A	0-20	X
Benzene	50.00	55.59	111	N/A	N/A	80-120	N/A	0-20	
Bromodichloromethane	50.00	56.94	114	N/A	N/A	75-120	N/A	0-20	
Bromoform	50.00	55.17	110	N/A	N/A	70-130	N/A	0-20	
Bromomethane	50.00	46.51	93	N/A	N/A	30-145	N/A	0-20	
2-Butanone	50.00	73.72	147	N/A	N/A	30-150	N/A	0-20	
Carbon Tetrachloride	50.00	57.05	114	N/A	N/A	65-140	N/A	0-20	
Chlorobenzene	50.00	55.74	111	N/A	N/A	80-120	N/A	0-20	
Chloroethane	50.00	44.59	89	N/A	N/A	60-135	N/A	0-20	
Chloroform	50.00	55.76	112	N/A	N/A	65-135	N/A	0-20	
Chloromethane	50.00	44.09	88	N/A	N/A	40-125	N/A	0-20	
Dibromochloromethane	50.00	56.86	114	N/A	N/A	60-135	N/A	0-20	
1,2-Dibromo-3-Chloropropane	50.00	50.20	100	N/A	N/A	50-130	N/A	0-20	
1,2-Dibromoethane	50.00	53.16	106	N/A	N/A	80-120	N/A	0-20	
1,2-Dichlorobenzene	50.00	55.19	110	N/A	N/A	70-120	N/A	0-20	
1,3-Dichlorobenzene	50.00	56.29	113	N/A	N/A	75-125	N/A	0-20	
1,4-Dichlorobenzene	50.00	53.66	107	N/A	N/A	75-125	N/A	0-20	
1,1-Dichloroethane	50.00	54.70	109	N/A	N/A	70-135	N/A	0-20	
1,2-Dichloroethane	50.00	54.58	109	N/A	N/A	70-130	N/A	0-20	
1,1-Dichloroethene	50.00	56.87	114	N/A	N/A	70-130	N/A	0-20	
c-1,2-Dichloroethene	50.00	60.26	121	N/A	N/A	70-125	N/A	0-20	
t-1,2-Dichloroethene	50.00	60.48	121	N/A	N/A	60-140	N/A	0-20	
1,2-Dichloropropane	50.00	54.59	109	N/A	N/A	75-125	N/A	0-20	
c-1,3-Dichloropropene	50.00	60.96	122	N/A	N/A	70-130	N/A	0-20	
t-1,3-Dichloropropene	50.00	57.76	116	N/A	N/A	55-140	N/A	0-20	
Ethylbenzene	50.00	54.18	108	N/A	N/A	75-125	N/A	0-20	
Methylene Chloride	50.00	58.28	117	N/A	N/A	55-140	N/A	0-20	
4-Methyl-2-Pentanone	50.00	54.88	110	N/A	N/A	60-135	N/A	0-20	
Styrene	50.00	55.97	112	N/A	N/A	65-135	N/A	0-20	
1,1,1,2-Tetrachloroethane	50.00	53.52	107	N/A	N/A	80-130	N/A	0-20	
1,1,2,2-Tetrachloroethane	50.00	52.78	106	N/A	N/A	65-130	N/A	0-20	
Tetrachloroethene	50.00	52.76	106	N/A	N/A	45-150	N/A	0-20	
Toluene	50.00	55.00	110	N/A	N/A	75-120	N/A	0-20	
1,2,4-Trichlorobenzene	50.00	54.75	109	N/A	N/A	65-135	N/A	0-20	
1,1,1-Trichloroethane	50.00	57.01	114	N/A	N/A	65-130	N/A	0-20	
Hexachloro-1,3-Butadiene	50.00	50.94	102	N/A	N/A	50-140	N/A	0-20	

RPD: Relative Percent Difference. CL: Control Limits

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Quality Control - LCS/LCSD

Environmental Science International, Inc.	Date Received:	07/25/14
354 Uluniu Street, Suite 304	Work Order:	14-07-1772
Kailua, HI 96734-2500	Preparation:	EPA 5030C
	Method:	GC/MS / EPA 8260B
Project: Red Hill LTM 112066		Page 5 of 5

Parameter	Spike Added	LCS Conc.	LCS %Rec.	LCSD Conc.	LCSD %Rec.	%Rec. CL	RPD	RPD CL	Qualifiers
1,1,2-Trichloroethane	50.00	53.25	107	N/A	N/A	75-125	N/A	0-20	
Trichloroethene	50.00	57.21	114	N/A	N/A	70-125	N/A	0-20	
1,2,3-Trichloropropane	50.00	52.38	105	N/A	N/A	75-125	N/A	0-20	
Vinyl Chloride	50.00	46.13	92	N/A	N/A	50-145	N/A	0-20	
p/m-Xylene	100.0	109.1	109	N/A	N/A	75-130	N/A	0-20	
o-Xylene	50.00	56.95	114	N/A	N/A	80-120	N/A	0-20	
Methyl-t-Butyl Ether (MTBE)	50.00	55.13	110	N/A	N/A	65-125	N/A	0-20	
Gasoline Range Organics	1000	1071	107	995.8	100	80-120	7	0-20	

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RPD: Relative Percent Difference. CL: Control Limits

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Sample Analysis Summary Report

Work Order: 14-07-1772 Page 1 of 1

Method	Extraction	Chemist ID	Instrument	Analytical Location
EPA 6020	EPA 3005A Filt.	598	ICP/MS 03	1
EPA 8015B (M)	EPA 3510C	847	GC 46	1
EPA 8270C SIM PAHs	EPA 3510C	923	GC/MS AAA	1
GC/MS / EPA 8260B	EPA 5030C	849	GC/MS OO	2

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Glossary of Terms and Qualifiers

Work Order: 14-07-1772 Page 1 of 1

Qualifiers	Definition
*	See applicable analysis comment.
<	Less than the indicated value.
>	Greater than the indicated value.
1	Surrogate compound recovery was out of control due to a required sample dilution. Therefore, the sample data was reported without further clarification.
2	Surrogate compound recovery was out of control due to matrix interference. The associated method blank surrogate spike compound was in control and, therefore, the sample data was reported without further clarification.
3	Recovery of the Matrix Spike (MS) or Matrix Spike Duplicate (MSD) compound was out of control due to suspected matrix interference. The associated LCS recovery was in control.
4	The MS/MSD RPD was out of control due to suspected matrix interference.
5	The PDS/PDSD or PES/PESD associated with this batch of samples was out of control due to suspected matrix interference.
6	Surrogate recovery below the acceptance limit.
7	Surrogate recovery above the acceptance limit.
B	Analyte was present in the associated method blank.
BU	Sample analyzed after holding time expired.
BV	Sample received after holding time expired.
DL	The Detection Limit (DL) is the smallest analyte concentration that can be demonstrated to be different from zero or a blank concentration at the 99% level of confidence.
E	Concentration exceeds the calibration range.
ET	Sample was extracted past end of recommended max. holding time.
HD	The chromatographic pattern was inconsistent with the profile of the reference fuel standard.
ICH	Initial calibration verification recovery is above the control limit for this analyte.
ICJ	Initial calibration verification recovery is below the control limit for this analyte.
IH	Calibration verification recovery is above the control limit for this analyte.
IJ	Calibration verification recovery is below the control limit for this analyte.
J	Analyte was detected at a concentration below the LOQ and above the DL. Reported value is estimated.
JA	Analyte positively identified but quantitation is an estimate.
LOD	The Limit of Detection (LOD) is the smallest amount or concentration of a substance that must be present in a sample in order to be detected at 99% confidence level.
LOQ	The Limit of Quantitation (LOQ) is the lowest concentration of a substance that produces a quantitative result within specified limits of precision and bias.
Q	Spike recovery and RPD control limits do not apply resulting from the parameter concentration in the sample exceeding the spike concentration by a factor of four or greater.
SG	The sample extract was subjected to Silica Gel treatment prior to analysis.
U	Undetected at Detection Limit (DL) and is reported as less than the Limit of Detection (LOD).
X	% Recovery and/or RPD out-of-range.
Z	Analyte presence was not confirmed by second column or GC/MS analysis.
	Solid - Unless otherwise indicated, solid sample data is reported on a wet weight basis, not corrected for % moisture. All QC results are reported on a wet weight basis.
	Any parameter identified in 40CFR Part 136.3 Table II that is designated as "analyze immediately" with a holding time of <= 15 minutes (40CFR-136.3 Table II, footnote 4), is considered a "field" test and the reported results will be qualified as being received outside of the stated holding time unless received at the laboratory within 15 minutes of the collection time.
	A calculated total result (Example: Total Pesticides) is the summation of each component concentration and/or, if "J" flags are reported, estimated concentration. Component concentrations showing not detected (ND) are summed into the calculated total result as zero concentrations.

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Calscience Environmental Laboratories, Inc.

7440 Lincoln Way, Garden Grove, CA 92841-1427 • (714) 895-5494
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contact sales@calscience.com or call us.

WO # / LAB USE ONLY: **14-07-1772**

CHAIN OF CUSTODY RECORD

Date 7/24/14
Page 1 of 1

LABORATORY CLIENT: Environmental Science International
ADDRESS: 354 Uluniu St., Suite 304
CITY: Kailua STATE: HI ZIP: 96734
TEL: 808-261-0740 E-MAIL: rchong@esciencei.com, dfeher@escienci.com

CLIENT PROJECT NAME / NUMBER: Red Hill 112066
P.O. NO.:
PROJECT CONTACT: Robert Chong
SAMPLER(S): (PRINT) Jeff Hattemer, Justin Lu

TURNAROUND TIME (Rush surcharges may apply to any TAT not "STANDARD"): ☐ SAME DAY ☐ 24 HR ☐ 48 HR ☐ 72 HR ☐ 5 DAYS ☒ STANDARD

☐ COELT EDF GLOBAL ID: LOG CODE:

SPECIAL INSTRUCTIONS: Regular (full) GW monitoring analyte list

REQUESTED ANALYSES

Please check box or fill in blank as needed.

LAB USE ONLY	SAMPLE ID	SAMPLING DATE	SAMPLING TIME	MATRIX	NO. OF CONT.	Unpreserved	Preserved	Field Filtered	☒ TPH(g) ~~☐ GRO~~ (8260)	☒ TPH(d) ~~☐ DRO~~ (8015)	TPH ☐ C6-C36 ☐ C6-C44	TPH ___	BTEX / MTBE ☐ 8260 ☐ ___	VOCs (8260)	Oxygenates (8260)	Prep (5035) ☐ En Core ☐ Terra Core	SVOCs (8270)	Pesticides (8081)	PCBs (8082)	PAHs ☐ 8270 ☒ 8270 SIM	T22 Metals ☐ 6010/747X ☐ 6020/747X	Cr(VI) ☐ 7196 ☐ 7199 ☐ 218.6	Lead (6020)			
1	ESTRIP	7/24/14	0800	water	3		X		X					X												
2	ES109	7/24/14	0900	water	10		X	X	X	X				X						X			X			
3	ES109 MS/MSD	7/24/14	0900	water	10		X	X	X	X				X						X			X			
4	ES110	7/24/14	1000	water	10		X	X	X	X				X						X			X			

2 3 in 7/25/14

Relinquished by: (Signature)	Received by: (Signature/Affiliation)	Date:	Time:
[signature] Jeff Hattemer		7/24/14	1015
(Fedex)	[signature] ECI	7/25/14	1000

DISTRIBUTION: White with final report, Green and Yellow to Client.
Please note that pages 1 and 2 of 2 of our T/Cs are printed on the reverse side of the Green and Yellow copies, respectively.

01/01/14 Revision

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Phone 714 870-3494

laboratories

1 Way

Dept./Floor/Suite/Room

ing address.

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- ☐ FedEx 2Day — Second business afternoon.* Thursday shipments will be delivered on Monday unless SATURDAY Delivery is selected.
- ☐ FedEx Express Saver — Third business day.* Saturday Delivery NOT available.

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* Declared value limit $500.

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☐ Direct Signature — Someone at recipient's address may sign for delivery. *Fee applies.*

☐ Indirect Signature — If no one is available at recipient's address, someone at a neighboring address may sign for delivery. For residential deliveries only. *Fee applies.*

Does this shipment contain dangerous goods?

One box must be checked.

☒ No ☐ Yes As per attached Shipper's Declaration. ☐ Yes Shipper's Declaration not required. ☐ Dry Ice Dry Ice, 9, UN 1845 ____ x ____ kg

Dangerous goods (including dry ice) cannot be shipped in FedEx packaging or placed in a FedEx Express Drop Box.

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Obtain recip. Acct. No. ☐

☐ Sender Acct. No. in Section 1 will be billed. ☒ Recipient ☐ Third Party ☐ Credit Card ☐ Cash/Check

[redacted]68

Total Packages 1 Total Weight 61 lbs.

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Airbill Number of FedEx Pouch Used

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WORK ORDER #: 14-07-1772

SAMPLE RECEIPT FORM

Cooler 1 of 1

CLIENT: Env'l. Science Int'l.

DATE: 07/25/14

TEMPERATURE: Thermometer ID: SC1 (Criteria: 0.0 °C – 6.0 °C, not frozen except sediment/tissue)

Temperature 2.7 °C - 0.3 °C (CF) = 2.4 °C ☑ Blank ☐ Sample

☐ Sample(s) outside temperature criteria (PM/APM contacted by: _____)

☐ Sample(s) outside temperature criteria but received on ice/chilled on same day of sampling.

☐ Received at ambient temperature, placed on ice for transport by Courier.

Ambient Temperature: ☐ Air ☐ Filter Checked by: SM

CUSTODY SEALS INTACT:

☐ Cooler ☐_____ ☐ No (Not Intact) ☐ Not Present ☐ N/A Checked by: SM

☑ Sample ☐_____ ☐ No (Not Intact) ~~☑ Not Present~~ 7/8 07251K Checked by: 812

SAMPLE CONDITION:	Yes	No	N/A
Chain-Of-Custody (COC) document(s) received with samples	☑	☐	☐
COC document(s) received complete	☑	☐	☐
☐ Collection date/time, matrix, and/or # of containers logged in based on sample labels.			
☐ No analysis requested. ☐ Not relinquished. ☐ No date/time relinquished.			
Sampler's name indicated on COC	☑	☐	☐
Sample container label(s) consistent with COC	☑	☐	☐
Sample container(s) intact and good condition	☑	☐	☐
Proper containers and sufficient volume for analyses requested	☑	☐	☐
Analyses received within holding time	☑	☐	☐
Aqueous samples received within 15-minute holding time			
☐ pH ☐ Residual Chlorine ☐ Dissolved Sulfides ☐ Dissolved Oxygen	☐	☐	☑
Proper preservation noted on COC or sample container	☑	☐	☐
☑ Unpreserved vials received for Volatiles analysis			
Volatile analysis container(s) free of headspace	☑	☐	☐
Tedlar bag(s) free of condensation	☐	☐	☑

CONTAINER TYPE:

Solid: ☐4ozCGJ ☐8ozCGJ ☐16ozCGJ ☐Sleeve (_____) ☐EnCores® ☐TerraCores® ☐_____

Aqueous: ☑VOA 18 ☑VOAh 11 ☐VOA**na₂** ☐125AGB ☐125AGB**h** ☐125AGB**p** ☑1AGB 4 ☐1AGB**na₂** ☐1AGB**s**

☐500AGB ☑500AGJ 3 ☐500AGJ**s** ☐250AGB ☐250CGB ☐250CGB**s** ☐1PB ☐1PB**na** ☐500PB

☐250PB ☑250PB**n** 3 ☐125PB ☐125PB**znna** ☐100PJ ☐100PJ**na₂** ☐_____ ☐_____ ☐_____

Air: ☐Tedlar® ☐Canister **Other:** ☐_____ **Trip Blank Lot#:** 140702B **Labeled/Checked by:** 812

Container: **C:** Clear **A:** Amber **P:** Plastic **G:** Glass **J:** Jar **B:** Bottle **Z:** Ziploc/Resealable Bag **E:** Envelope **Reviewed by:** 776

Preservative: **h:** HCL **n:** HNO_3 **na₂:** $Na_2S_2O_3$ **na:** NaOH **p:** H_3PO_4 **s:** H_2SO_4 **u:** Ultra-pure **znna:** $ZnAc_2$+NaOH **f:** Filtered **Scanned by:** 776

RAW DATA SHEET
FOR METHOD: EPA 8015B (M)

WORK ORDER:	**14-07-1772**	ANALYZED BY:	847
INSTRUMENT:	GC 46	D/T ANALYZED:	2014-07-30 01:15
EXTRACTION:	EPA 3510C	REVIEWED BY:	
D/T EXTRACTED:	2014-07-28 00:00	D/T REVIEWED:	

DATA FILE: W:\GC_45_46\DATA\GC46\2014\140729\14072947.D\14072947

 # 2 **CLIENT SAMPLE NUMBER: ES109**

LCS/MB BATCH:	140728B13	SAMPLE VOLUME / WEIGHT:	DEFAULT: 500.00 ml / ACTUAL: 480.00 ml
MS/MSD BATCH:	140728S13	FINAL VOLUME / WEIGHT:	DEFAULT: 5.00 ml / ACTUAL: 2.50 ml
UNITS:	ug/L	ADJUSTMENT RATIO TO PF:	0.52

COMMENT: Results were evaluated to the MDL (DL), concentrations >= to the MDL (DL) but < RL (LOQ), if found, are qualified with a "J" flag.

COMPOUND	INI. CONC	DF	CONC	DL	LOD	LOQ	QUAL
TPH as Diesel	3280	1.00	17.1	12	13	26	bJ

Area Percent Report

Data File Name : W:\GC_45_46\DATA\GC46\2014\140729\14072947.D
Page Number : 1
Operator : 847
Instrument : GC 46
Sample Name : 14-07-1772-2

Vial Number : Vial 47
Injection Number : 1
Sequence Line : 48
Instrument Method: C:\CHEM32\2\METHODS\ ->

Acquired on : 30 Jul 14 01:15 am
Report Created on: 30 Jul 14 11:55 am

Analysis Method : 8015B.MTH

Sig. 1 in W:\GC_45_46\DATA\GC46\2014\140729->

Pk	Ret Time	Area	Height	Peak	Width	Response %
1	2.695	14.56	5	VV	0.040	1.969
2	2.808	1.59	1	VV	0.025	0.215
3	2.867	9.61	3	VV	0.048	1.300
4	2.973	3.08	1	VV	0.043	0.416
5	3.102	2.71	2	VV	0.022	0.367
6	3.189	0.74	0	VV	0.042	0.100
7	3.320	1.67	1	VV	0.036	0.226
8	3.434	0.26	0	VV	0.032	0.036
9	3.630	1.52	0	VV	0.060	0.205
10	3.698	2.48	2	VV	0.022	0.336
11	3.780	0.84	0	VV	0.051	0.114
12	3.950	0.77	1	VV	0.023	0.105
13	4.044	1.45	1	VB	0.032	0.197
14	4.289	0.93	0	BV	0.064	0.126
15	4.403	0.68	0	VV	0.038	0.091
16	4.459	0.71	0	VV	0.042	0.096
17	4.561	0.40	0	VV	0.050	0.054
18	4.627	0.53	0	VV	0.033	0.071
19	4.711	4.12	1	VV	0.049	0.557
20	4.857	5.72	4	VV	0.020	0.774
21	4.918	0.85	1	VV	0.026	0.115
22	5.009	1.27	1	VV	0.025	0.172
23	5.152	0.72	1	VV	0.022	0.098
24	5.295	682.00	503	VV	0.022	92.259

Total area = 739.23

Area Percent Report

Data File Name : W:\GC_45_46\DATA\GC46\2014\140729\14072947.D
Page Number : 2
Operator : 847
Instrument : GC 46
Sample Name : 14-07-1772-2

Acquired on : 30 Jul 14 01:15 am
Report Created on: 30 Jul 14 11:55 am

Vial Number : Vial 47
Injection Number : 1
Sequence Line : 48
Instrument Method: C:\CHEM32\2\METHODS\ ->

Analysis Method : 8015B.MTH

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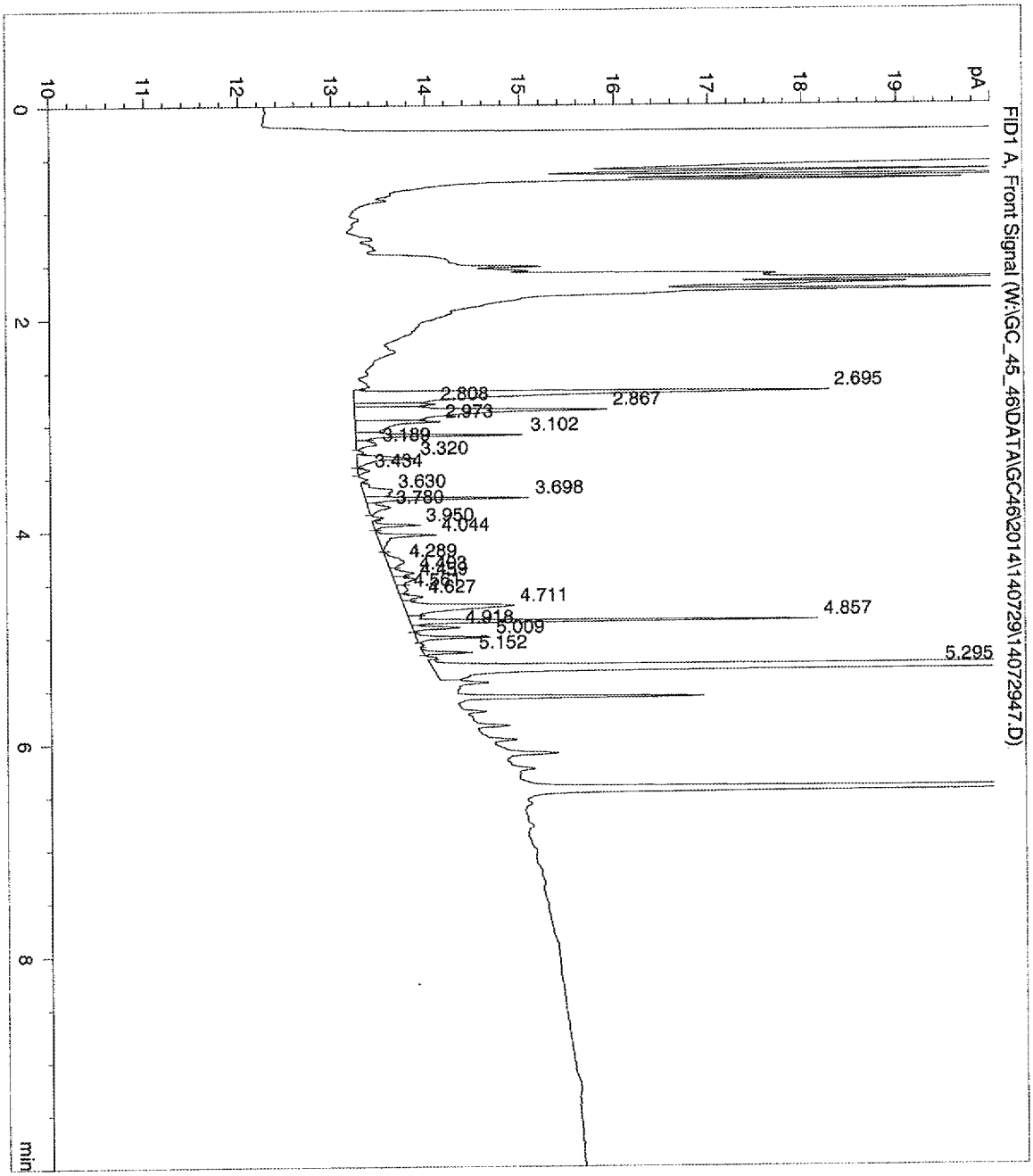

RAW DATA SHEET
FOR METHOD: EPA 8015B (M)

WORK ORDER:	**14-07-1772**	ANALYZED BY:	847
INSTRUMENT:	GC 46	D/T ANALYZED:	2014-07-30 01:32
EXTRACTION:	EPA 3510C	REVIEWED BY:	
D/T EXTRACTED:	2014-07-28 00:00	D/T REVIEWED:	

DATA FILE: W:\GC_45_46\DATA\GC46\2014\140729\14072948.D\14072948

 # 3 **CLIENT SAMPLE NUMBER: ES110**

LCS/MB BATCH:	140728B13	SAMPLE VOLUME / WEIGHT:	DEFAULT: 500.00 ml / ACTUAL: 500.00 ml
MS/MSD BATCH:	140728S13	FINAL VOLUME / WEIGHT:	DEFAULT: 5.00 ml / ACTUAL: 2.50 ml
UNITS:	ug/L	ADJUSTMENT RATIO TO PF:	0.50

COMMENT: Results were evaluated to the MDL (DL), concentrations >= to the MDL (DL) but < RL (LOQ), if found, are qualified with a "J" flag.

COMPOUND	INI. CONC	DF	CONC	DL	LOD	LOQ	QUAL
TPH as Diesel	3090	1.00	15.5	11	12	25	bJ

Area Percent Report

Data File Name : W:\GC_45_46\DATA\GC46\2014\140729\14072948.D
Page Number : 1
Operator : 847
Instrument : GC 46
Sample Name : 14-07-1772-3

Acquired on : 30 Jul 14 01:32 am
Report Created on: 30 Jul 14 11:56 am

Vial Number : Vial 48
Injection Number : 1
Sequence Line : 49
Instrument Method: C:\CHEM32\2\METHODS\ ->

Analysis Method : 8015B.MTH

Sig. 1 in W:\GC_45_46\DATA\GC46\2014\140729->

Pk	Ret Time	Area	Height	Peak	Width	Response %
1	2.639	0.37	0	VV	0.044	0.052
2	2.698	12.86	5	VV	0.038	1.811
3	2.809	1.47	1	VV	0.025	0.207
4	2.867	9.06	3	VV	0.046	1.276
5	2.973	2.71	1	VV	0.043	0.382
6	3.102	2.59	2	VV	0.020	0.364
7	3.191	0.65	0	VV	0.041	0.091
8	3.319	1.65	1	VV	0.036	0.233
9	3.433	0.27	0	VV	0.031	0.038
10	3.620	1.13	0	VV	0.047	0.159
11	3.662	0.50	0	VV	0.023	0.070
12	3.697	2.59	2	VV	0.023	0.365
13	3.782	0.81	0	VV	0.050	0.113
14	3.882	0.23	0	VV	0.022	0.033
15	3.950	0.75	0	VV	0.025	0.106
16	4.046	0.79	1	VV	0.023	0.111
17	4.086	0.30	0	VB	0.030	0.042
18	4.292	0.73	0	BV	0.060	0.103
19	4.402	0.79	0	VV	0.042	0.111
20	4.463	0.58	0	VV	0.044	0.082
21	4.629	0.37	0	VV	0.027	0.052
22	4.715	3.52	1	VV	0.050	0.496
23	4.857	6.04	5	VV	0.020	0.850
24	4.921	1.16	1	VV	0.025	0.163
25	5.010	1.23	1	VV	0.024	0.173
26	5.153	0.74	1	VV	0.020	0.104
27	5.296	656.29	482	VV	0.021	92.414

Total area = 710.17

Area Percent Report

Data File Name : W:\GC_45_46\DATA\GC46\2014\140729\14072948.D
Page Number : 2
Operator : 847
Instrument : GC 46
Sample Name : 14-07-1772-3

Acquired on : 30 Jul 14 01:32 am
Report Created on: 30 Jul 14 11:56 am

Vial Number : Vial 48
Injection Number : 1
Sequence Line : 49
Instrument Method: C:\CHEM32\2\METHODS\ ->

Analysis Method : 8015B.MTH

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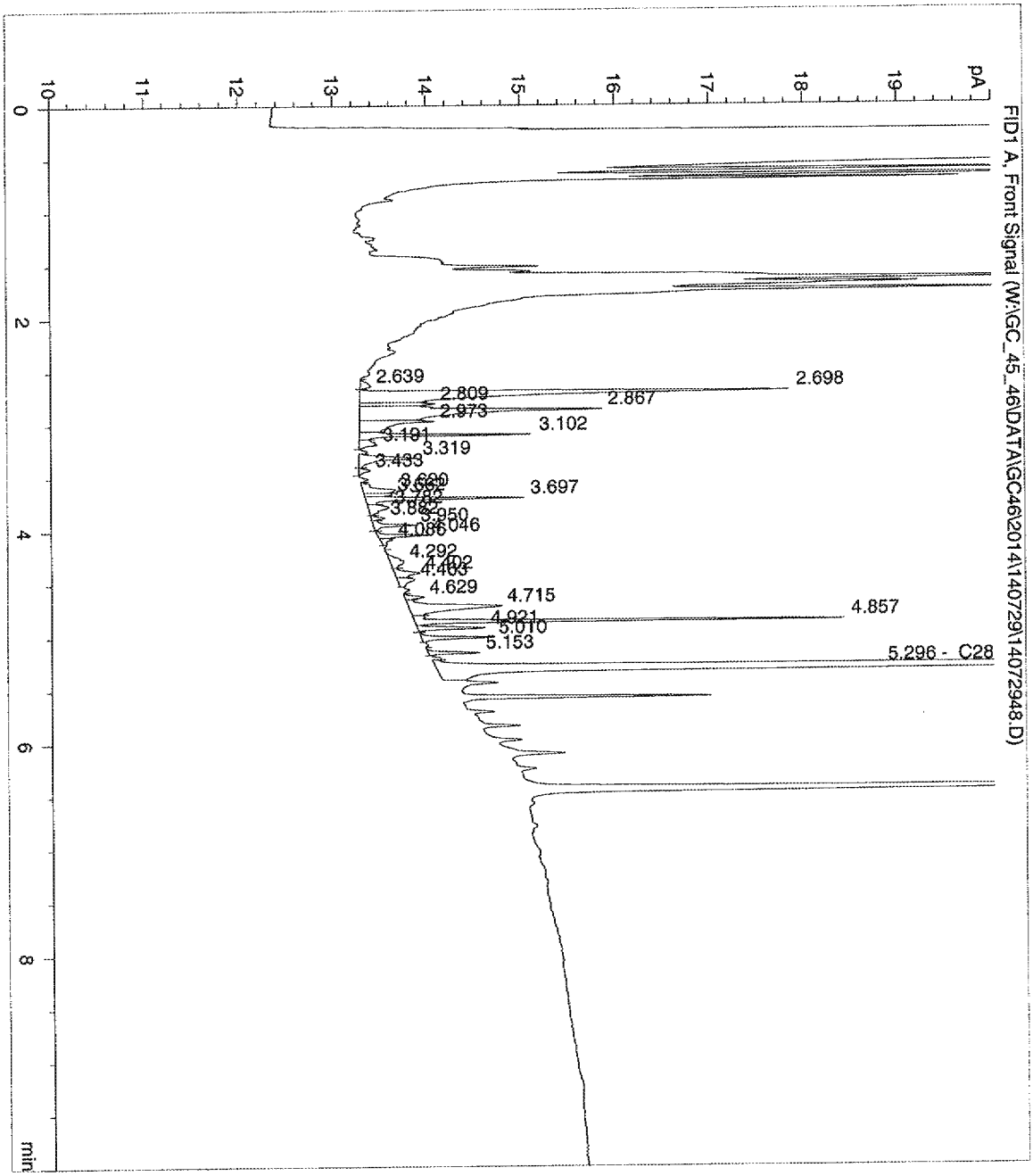


RAW DATA SHEET
FOR METHOD: EPA 8015B (M)

WORK ORDER:	**099-15-516**	ANALYZED BY:	847
INSTRUMENT:	GC 46	D/T ANALYZED:	2014-07-29 23:50
EXTRACTION:	EPA 3510C	REVIEWED BY:	
D/T EXTRACTED:	2014-07-28 00:00	D/T REVIEWED:	

DATA FILE: W:\GC_45_46\DATA\GC46\2014\140729\14072942.D\14072942

 # MB **CLIENT SAMPLE NUMBER: Method Blank**

LCS/MB BATCH:	140728B13	SAMPLE VOLUME / WEIGHT:	DEFAULT: 500.00 ml / ACTUAL: 500.00 ml
MS/MSD BATCH:		FINAL VOLUME / WEIGHT:	DEFAULT: 5.00 ml / ACTUAL: 2.50 ml
UNITS:	ug/L	ADJUSTMENT RATIO TO PF:	0.50

COMMENT:

COMPOUND	INI. CONC	DF	CONC	DL	LOD	LOQ	QUAL
TPH as Diesel	0.000	1.00	ND	11	12	25	

Area Percent Report

Data File Name : W:\GC_45_46\DATA\GC46\2014\140729\14072942.D
Page Number : 1
Operator : 847
Instrument : GC 46
Sample Name : MB 14072813

Vial Number : Vial 42
Injection Number : 1
Sequence Line : 43
Instrument Method: C:\CHEM32\2\METHODS\ ->

Acquired on : 29 Jul 14 11:50 pm
Report Created on: 31 Jul 14 05:40 pm

Analysis Method : 8015B.MTH

Sig. 1 in W:\GC_45_46\DATA\GC46\2014\140729->

Pk	Ret Time	Area	Height	Peak	Width	Response %
1	5.287	608.87	448	VV	0.021	100.000

Total area = 608.87

Area Percent Report

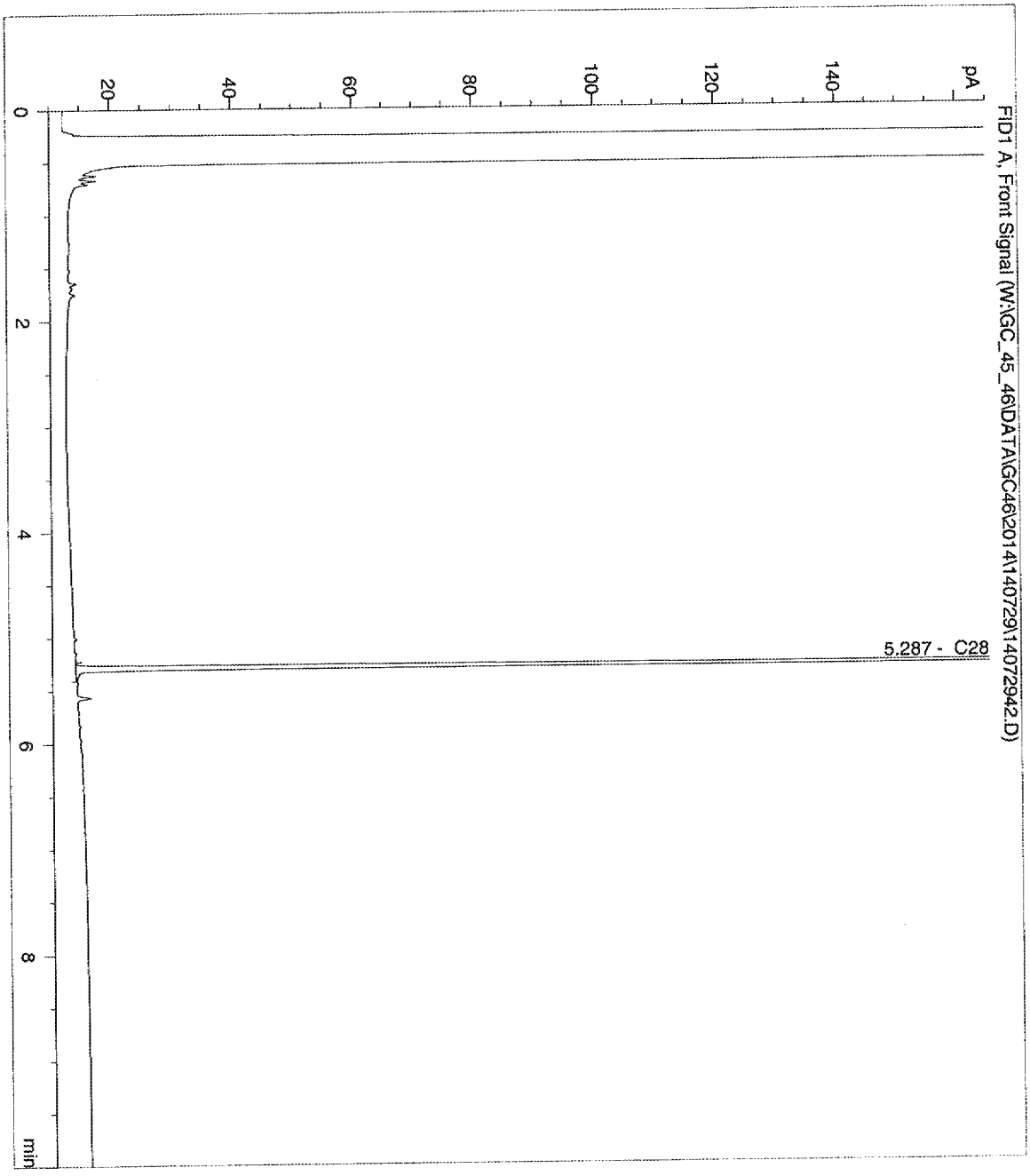
Data File Name : W:\GC_45_46\DATA\GC46\2014\140729\14072942.D
Page Number : 2
Operator : 847
Instrument : GC 46
Sample Name : MB 14072813

Acquired on : 29 Jul 14 11:50 pm
Report Created on: 31 Jul 14 05:40 pm

Vial Number : Vial 42
Injection Number : 1
Sequence Line : 43
Instrument Method: C:\CHEM32\2\METHODS\ ->

Analysis Method : 8015B.MTH

Software Revision: Rev. B.03.02 [341] Copyright © Agilent Technologies



Area Percent Report

Data File Name : W:\GC_45_46\DATA\GC46\2014\140729\14072943.D
Page Number : 1
Operator : 847
Instrument : GC 46
Sample Name : LCS 14072813

Vial Number : Vial 43
Injection Number : 1
Sequence Line : 44
Instrument Method: C:\CHEM32\2\METHODS\ ->

Acquired on : 30 Jul 14 00:07 am
Report Created on: 31 Jul 14 05:40 pm

Analysis Method : 8015B.MTH

Sig. 1 in W:\GC_45_46\DATA\GC46\2014\140729->

Pk	Ret Time	Area	Height	Peak	Width	Response %
1	0.618	2.54	3	BV	0.015	0.035
2	0.667	4.64	4	VV	0.016	0.064
3	0.698	3.55	2	VV	0.023	0.049
4	0.792	0.25	0	VV	0.021	0.003
5	0.881	3.03	2	VV	0.021	0.042
6	0.929	0.52	0	VV	0.026	0.007
7	0.988	0.25	0	VV	0.016	0.003
8	1.071	2.28	2	VV	0.022	0.032
9	1.098	1.48	1	VV	0.016	0.021
10	1.124	4.21	3	VV	0.024	0.058
11	1.171	2.31	1	VV	0.024	0.032
12	1.205	1.60	2	VV	0.015	0.022
13	1.230	5.72	3	VV	0.029	0.079
14	1.347	14.68	5	VV	0.041	0.203
15	1.424	6.04	4	VV	0.022	0.084
16	1.462	5.05	4	VV	0.018	0.070
17	1.486	5.62	5	VV	0.018	0.078
18	1.546	20.89	6	VV	0.048	0.289
19	1.611	18.25	8	VV	0.032	0.253
20	1.639	5.05	5	VV	0.015	0.070
21	1.661	6.26	5	VV	0.016	0.087
22	1.697	22.20	13	VV	0.025	0.308
23	1.722	14.25	8	VV	0.025	0.197
24	1.766	8.70	7	VV	0.019	0.121
25	1.797	26.48	15	VV	0.026	0.367
26	1.826	26.80	12	VV	0.034	0.371
27	1.873	28.61	15	VV	0.026	0.396
28	1.916	37.91	26	VV	0.021	0.525
29	1.978	47.33	17	VV	0.036	0.656
30	2.022	44.21	21	VV	0.030	0.613
31	2.104	133.24	37	VV	0.047	1.846
32	2.205	152.17	70	VV	0.029	2.108
33	2.267	104.03	35	VV	0.038	1.441
34	2.313	59.40	31	VV	0.026	0.823
35	2.371	201.66	48	VV	0.054	2.794
36	2.468	176.91	90	VV	0.028	2.451
37	2.496	84.77	48	VV	0.025	1.175
38	2.541	49.24	31	VV	0.023	0.682
39	2.595	116.97	39	VV	0.043	1.621
40	2.640	165.04	50	VV	0.042	2.287
41	2.711	239.75	91	VV	0.036	3.322
42	2.800	83.33	37	VV	0.031	1.155
43	2.829	67.88	43	VV	0.022	0.941
44	2.879	147.84	51	VV	0.039	2.048
45	2.939	245.47	95	VV	0.034	3.401

Area Percent Report

Data File Name : W:\GC_45_46\DATA\GC46\2014\140729\14072943.D
Page Number : 2
Operator : 847
Instrument : GC 46
Sample Name : LCS 14072813

Vial Number : Vial 43
Injection Number : 1
Sequence Line : 44
Instrument Method: C:\CHEM32\2\METHODS\ ->

Acquired on : 30 Jul 14 00:07 am
Report Created on: 31 Jul 14 05:40 pm

Analysis Method : 8015B.MTH

Pk	Ret Time	Area	Height	Peak	Width	Response %
46	3.010	61.41	36	VV	0.025	0.851
47	3.067	235.79	61	VV	0.051	3.267
48	3.116	55.24	40	VV	0.020	0.765
49	3.155	273.54	99	VV	0.036	3.790
50	3.282	272.85	56	VV	0.061	3.780
51	3.358	243.51	99	VV	0.033	3.374
52	3.400	73.00	46	VV	0.024	1.011
53	3.447	166.02	75	VV	0.031	2.300
54	3.485	149.22	58	VV	0.037	2.068
55	3.553	344.61	147	VV	0.032	4.775
56	3.634	222.57	64	VV	0.047	3.084
57	3.677	175.70	62	VV	0.038	2.434
58	3.738	322.52	124	VV	0.036	4.469
59	3.812	148.01	53	VV	0.037	2.051
60	3.860	141.11	51	VV	0.036	1.955
61	3.909	263.58	83	VV	0.042	3.652
62	3.978	105.47	43	VV	0.033	1.461
63	4.016	57.12	40	VV	0.021	0.791
64	4.036	66.00	40	VV	0.023	0.914
65	4.079	164.16	60	VV	0.037	2.275
66	4.144	81.87	32	VV	0.036	1.134
67	4.196	77.80	31	VV	0.033	1.078
68	4.243	97.97	40	VV	0.034	1.357
69	4.287	71.17	22	VV	0.045	0.986
70	4.343	57.71	20	VV	0.038	0.800
71	4.403	62.99	25	VV	0.035	0.873
72	4.452	69.13	14	VV	0.062	0.958
73	4.561	34.49	13	VV	0.036	0.478
74	4.610	32.15	7	VV	0.058	0.445
75	4.715	32.57	6	VV	0.066	0.451
76	4.865	12.45	3	VV	0.062	0.172
77	5.014	3.13	1	VV	0.031	0.043
78	5.060	1.67	0	VV	0.048	0.023
79	5.159	1.12	1	VV	0.024	0.015
80	5.208	0.45	0	VV	0.035	0.006
81	5.304	640.73	474	VV	0.021	8.878

Total area = 7217.27

Area Percent Report

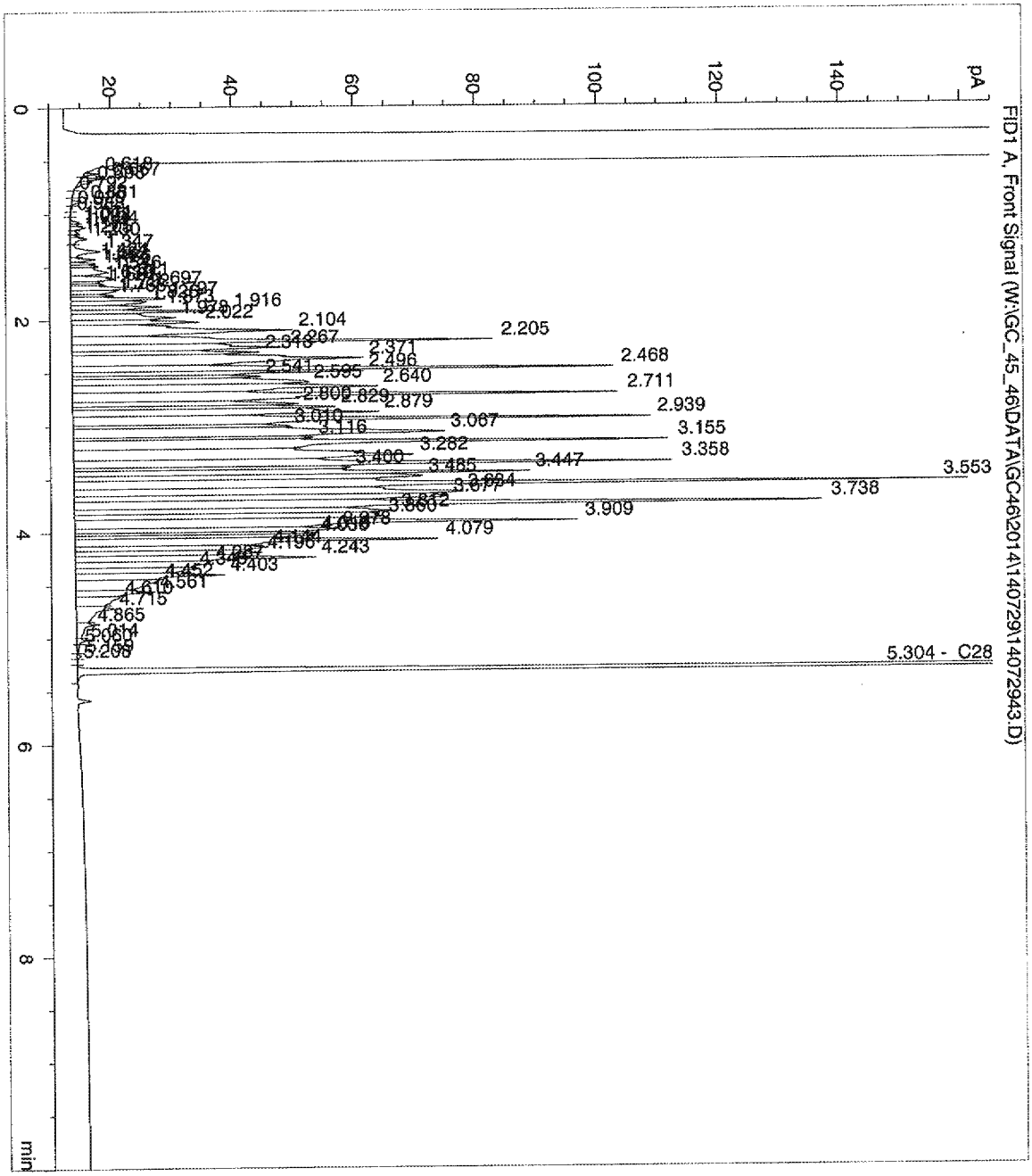
Data File Name : W:\GC_45_46\DATA\GC46\2014\140729\14072943.D
Page Number : 3
Operator : 847
Instrument : GC 46
Sample Name : LCS 14072813

Vial Number : Vial 43
Injection Number : 1
Sequence Line : 44
Instrument Method: C:\CHEM32\2\METHODS\ ->

Acquired on : 30 Jul 14 00:07 am
Report Created on: 31 Jul 14 05:40 pm

Analysis Method : 8015B.MTH

Software Revision: Rev. B.03.02 [341] Copyright © Agilent Technologies



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APPENDIX D

Historical Groundwater Exceedance Trends

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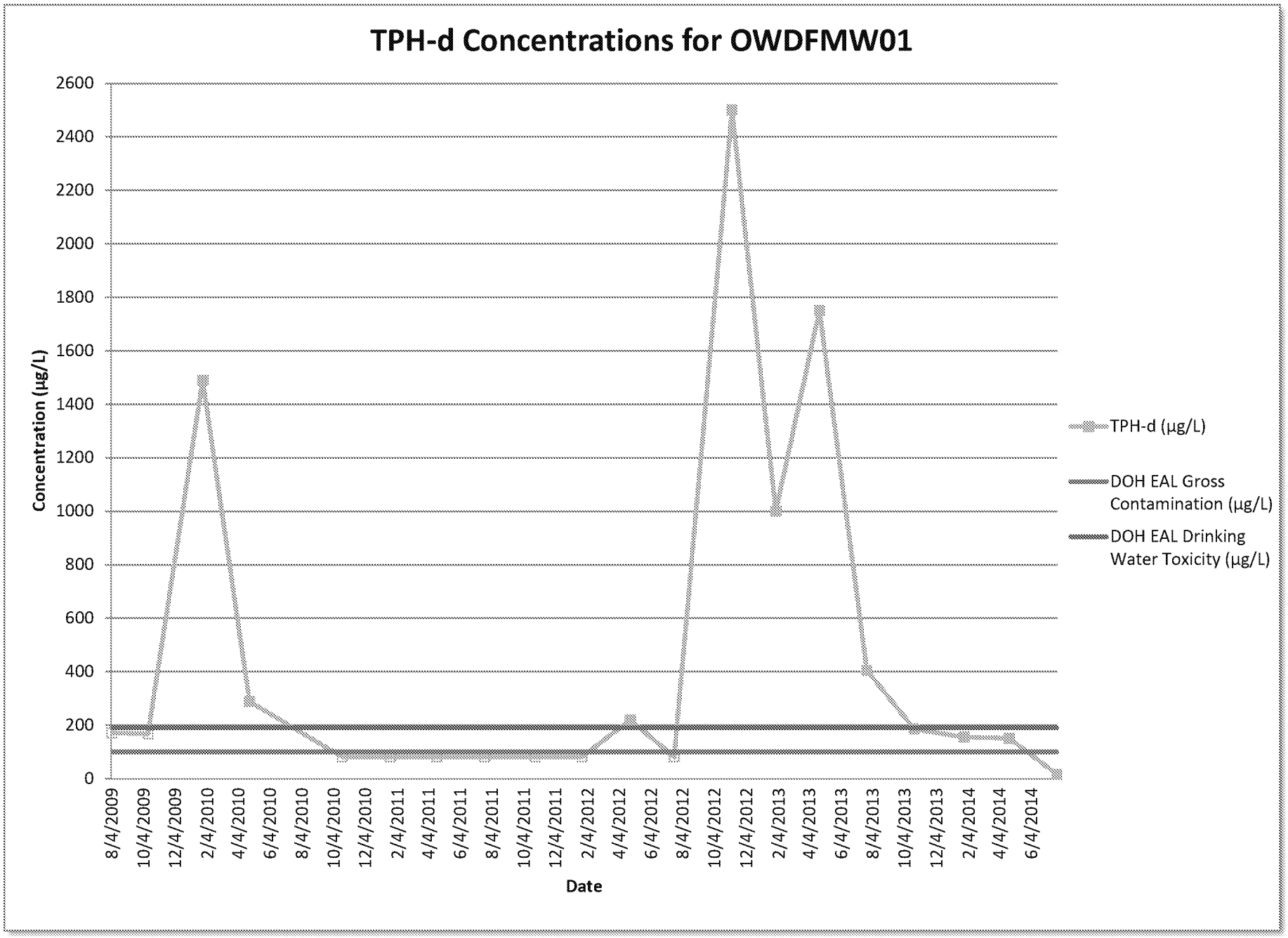

Data points for 10/21/2010 through 1/24/2012 and 11/07/2012 through 7/24/2014 are the average of the primary and duplicate samples.
Unfilled boxes indicate non-detections. Method detection limits are shown.

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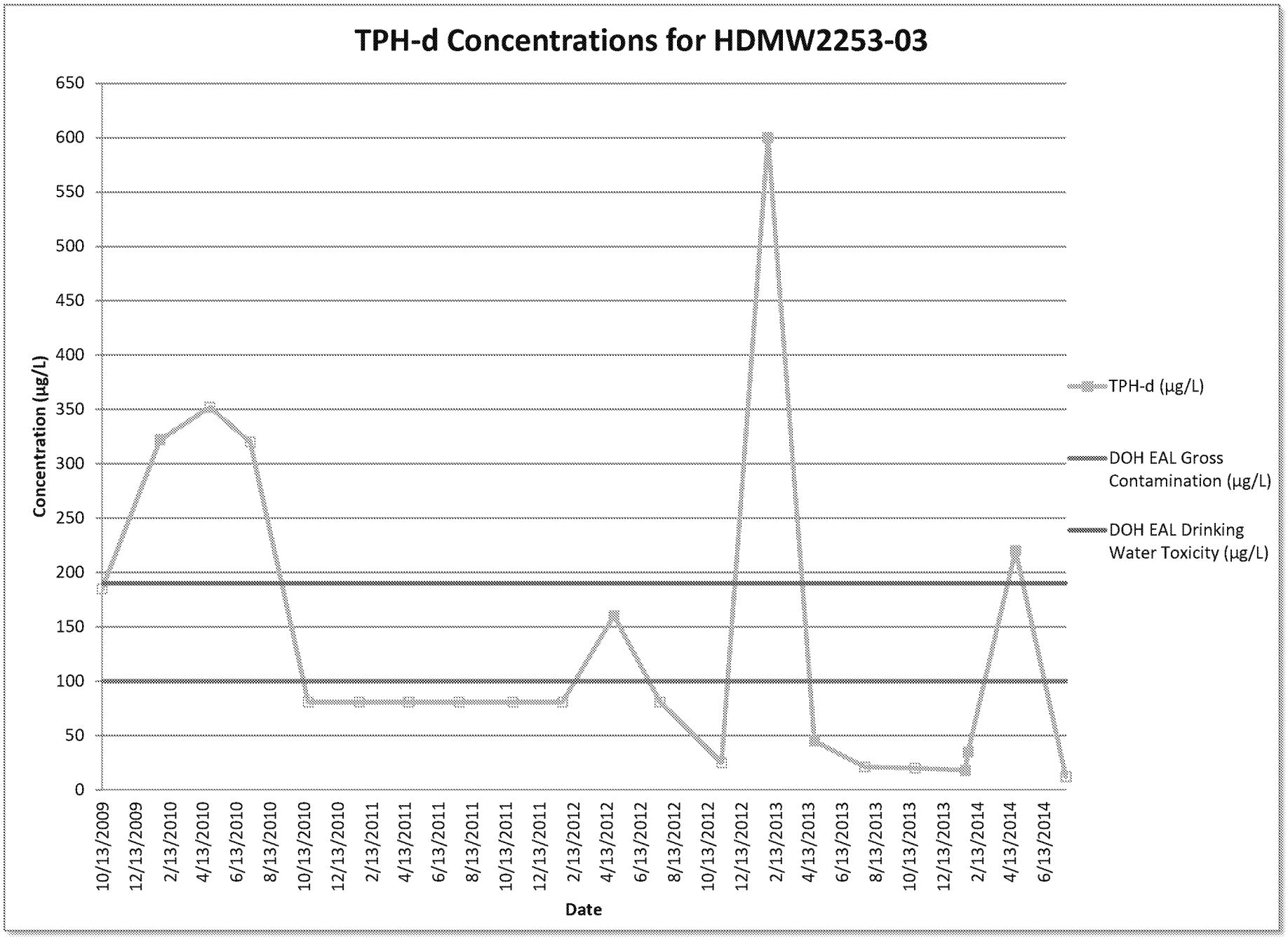

Unfilled boxes indicate non-detections. Method detection limits are shown.

4/23/2014 - A review of the chromatograms and historical data concluded the TPH-d subsample for HDMW2253-03 and the duplicate sample for OWDFMW-01 were likely switched during this event. The TPH-d concentration for the OWDFMW-01 duplicate sample was 32 ug/L.

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